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Televison and Education*

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INTRODUCTION

THE Federal Communications Commission has reserved some 258 channels, about 10 per cent of the total number of TV channels available, for non-commercial, educational purposes exclusively. 86 of these channels are in the VHF band; the remainder in the UHF wave band. At present there are 29 stations operating on channels reserved for educational purposes; further, there is one educational institution operating non-commercially on a commercial channel, and three institutions operating commercially on non-reserved channels. There are four additional educational stations which should be in operation before the end of the winter. Four additional communities are near the application stage while about a dozen others are actively interested in eventually developing stations.

There are about 50 million people living in the coverage area of the 29 existing stations. When the stations now in various stages of planning begin telecasting, this potential audience will have increased to nearly 60 million individuals.

Educational television stations are non-commercial, non-profit and prohibited by federal regulation from selling air time. They are locally owned and operated by educational institutions and organizations. These stations fall into three categories: (a) university stations, (b) community stations, and (c) state networks. Illustrative of these three categories are (a) the stations operated by the University of Houston (Texas), Michigan State University, University of Illinois, and the University of Ohio; (b) the community stations which are owned and operated by an association of the colleges and universities, city schools, cultural institutions and museums in the cities of Boston, Chicago, Cincinnati, Memphis, New Orleans, Pittsburgh, St. Louis and San Francisco; (c) state networks, Alabama, Florida and Oklahoma.

WHAT EDUCATIONAL TELEVISION IS

It is probably easiest to say what educational television is not—

* Presented at the U. S. Commissioner of Education's Advisory Committee of National Organizations on January 17, 1958 in Washington, D. C.

it is not competitive with commercial television, but rather should be considered complementary to it. It really is a matter of programming to minority audiences, anything from a college course for credit which might be considered 100 per cent education to an informational program on a city's urban renewal problems which might be considered only 10 per cent of education in the strict and narrow sense of the word. There may be only ten thousand sets tuned to a course in elementary German, but there we have a faithful group of listeners. Certainly, however, such a "rating" would not appeal to an advertiser who is interested in viewer impressions per dollar spent. On the other hand, what professor of German wouldn't be pleased to be teaching ten or fifteen thousand people, rather than ten or fifteen in his class?

If, by some chance, educational television should develop programs which reach a broad audience—which pull a high rating—then educational television may lose these programs to their commercial colleagues. If so, my reply is "fine." That is part of the object of the exercise—to get more people to listen to educational programming. If we at Chicago are fortunate enough to develop such a program and have it go commercial, we would consider it a success. Dr. Baxter with his "Shakespeare on Television" started in Los Angeles as an educational presentation. It went to the CBS network; Sonny Fox developed "The Finder" and ran it on the St. Louis educational station for nine months—it went to CBS and may now be seen on a national hook-up on Sunday mornings, as "Let's Take a Trip"; "The Children's Corner" ran for two years on the educational station in Pittsburgh and then went on a national NBC hook-up. Educational television will be a "farm" in relation to commercial television. We will be able to try out programs that the commercial operators will not be able to take a chance on, just as we will develop performers, producers and directors for commercial television. This can be a healthy situation for both divisions of the industry.

Let us now then distinguish between educational television and televised education. Educational television is that $64 thousand question to which community stations are trying to find the answer. If we cannot produce interesting educational programs of general nature, which a minority of the public will look at, then we cannot expect them to support us. Televised education is really the broadcasting of courses for credit. The audiences then are almost as

captive as they are in school classrooms. It is this latter area in which educational administrators should be most interested.

WHAT IS BEING DONE

More than 100 institutions of higher education are now broadcasting non-credit courses over commercial stations throughout the country, and about 50 public, private, and parochial schools; county and state boards of education; and community educational television councils or groups are telecasting educational programs. Courses for credit have been telecast by more than 40 institutions of higher education over commercial stations. Today about two dozen such institutions are conducting credit courses over non-commercial television stations. Educational stations alone this year are conducting almost 200 regular courses for high school or college credit.

At the elementary and secondary levels we find open circuit telecasting in almost every type of course: arithmetic, English, reading, nature study, general science, physics, history, health, algebra, geometry, art, trigonometry, chemistry, spelling, music, modern languages, and driver education. Alabama, Nebraska, North Carolina, and Oklahoma are operating on a state-wide basis, while important projects are underway in Atlanta, Boston, Cincinnati, Detroit, Milwaukee, Norfolk, Philadelphia, Pittsburgh and St. Louis.

Closed circuit operations on a limited basis are taking place in dozens of cities. The most comprehensive closed circuit operation is in Washington County, Maryland, where a five-year experimental project is underway involving over 12,000 pupils in 14 schools. Before the experiment is over, it will eventually cover all 48 of Washington County's public schools and their 18,000 pupils. The Radio, Electronics and Television Manufacturers Association has provided the equipment and the Chesapeake and Potomac Telephone Company has provided the transmission set-up, while the Fund for the Advancement of Education has made a grant in support of the whole operation.

At the college level, credit courses are being offered through closed circuit systems at Penn State University, Case Institute of Technology, the University of Minnesota, Washington State College, New York University, and Miami (Ohio) University.

Open circuit work at the college level is taking place on a limited basis at over two dozen institutions, with probably the most extensive projects being carried on at the University of Detroit, where the full freshman year is being offered, at San Francisco,

State College, where four courses are being given, and at Chicago, where a full two-year freshman and sophomore curriculum is being offered. I shall go into some detail concerning the Chicago TV College plan, since it is the one about which I know the most.

THE CHICAGO JUNIOR COLLEGE PLAN

After months of study, Chicago's General Superintendent of Schools Benjamin C. Willis and his associates decided to experiment with the use of open-circuit television facilities available through the Chicago Educational Television Association's Station WTTW on Channel 11. With the Board of Education's approval, a grant to support a three-year experiment in offering the first two years of college work via television was secured from the Fund for the Advancement of Education in late spring of 1956. With its own matching funds, the Board authorized the experiment to begin in September of 1956. The Board contracts with WTTW for the telecasting services, paying direct operating costs and a percentage toward depreciation of equipment.

The required subjects of the two-year curriculum are English, social science, biology, the humanities, and physical science, which account for thirty semester hours. The other thirty hours are chosen from many other course offerings, all of which could not, obviously, be given at one time over television. During the autumn semester of 1956-57, English, social science, biology, together with American government (three credit hours each) were offered. During the second semester, both English 101 and 102 were offered, together with Biology 102, Social Science 102, and Mathematics 101. In the autumn semester of 1957-58, Accounting 101, Humanities 101, Mathematics 105 (Slide Rule), Physical Science 101, Psychology 201, and Shorthand 120 were offered as new courses, while Biology 101, English 101, and Mathematics 101 were repeated by kinescope. In the spring semester of 1958, Accounting 102, Biology 102, English 102, Humanities 102, Physical Science 102, and Shorthand 121 were continued, while Mathematics 105 (Slide Rule) and Social Science 101 were repeated, and Political Science 221 (City Government) was offered for the first time. Thus, during the current year a full associate in arts degree curriculum is being offered.

Preparation: During the summer of 1956, a group of twelve teachers, composed of four teams of three each, prepared the autumn work. At the end of the period the teams were reduced to two each (a principal professor and an associate) to give the courses on the

air. The principal teacher is relieved of all work except his load of three one-half hour telecasts each week in his particular course. The alternate works with him and is relieved of three-fifths of his teaching load. Similarly, the summer of 1957 was used to prepare new courses for the autumn, while spring semester courses were prepared by different teams during the semester just passed.

Class size and teaching loads: For administrative purposes, TV students are divided into sections according to the following class sizes and teaching loads. In the English courses, where students have weekly compositions (which are mailed to the instructors, corrected and returned to the students), 36 students are equated as one-fifth of a teaching load for instructors servicing (not giving telecasts) TV students. Similarly, in the mathematics courses, which require evaluation of papers, 25 students are equated as one-fifteenth load. In general survey courses 50 students are equated as one-fifteenth load. Thus, instructors carrying on this service work receive and grade all papers, mail them back to the students, and administer and grade the mid-term and final examinations. Incidentally, TV students are consistently turning in a higher percentage of required written work than are the regularly enrolled resident students.

Registration: There follows a tabulation of credit as well as

CREDIT AND NON-CREDIT REGISTRATIONS, 1956-57

	FALL 1956		SPRING 1957		FALL 1957	
	Credit 1346 Individuals	Non-Credit 2761 Individuals	Credit 938 Individuals	Non-Credit 1564 Individuals	Credit 1511 Individuals	Non-Credit 5728 Individuals
Accounting 101	....	....	....	....	315	1132
Biology 101	628	1178	....	....	221	183
Biology 102	....	....	387	330	....	....
English 101	801	1518	186	593	277	453
English 102	....	....	389	774	....	....
Humanities 201	....	....	....	....	583	840
Mathematics 101	....	....	233	1529	149	382
Mathematics 105 (slide rule)	....	....	....	....	234	1963
Physical Science 101	....	....	....	....	381	336
Political Science 223	639	1203	....	....	....	....
Psychology 201	....	....	....	....	504	779
Shorthand 120	....	....	....	....	238	2269
Social Science 101	705	1335	....	....	....	....
Social Science 102	....	....	424	339	....	....
TOTALS	2773	5234	1619	3565	2902	8337

non-credit registration by subject. It will be noted that in general each individual student averages the equivalent of two three semester-hour courses. Very few are permitted to carry heavier loads. The percentage of originally enrolled students who are awarded final grades averaged 61% for the first semester and 71% for the second semester.

Not-for-credit enrollment: Each semester each course has been set up in outline in a special TV study guide. These are furnished gratis to the students who enroll for credit, and they are offered for a dollar each to anyone in the community who may wish to use them in following courses as auditors. In the fall of 1956, 5234 study guides were sold; in spring, 1957, 3565 were sold; and in the semester just passed, 8337 were sold, making a total of 17,136. It is interesting to note that commercial rating services report anywhere from eight to eighteen thousand as the average number of viewers of these courses.

Time of broadcasts: Courses are broadcast in day and evening time. For example, a course which is broadcast in the daytime is repeated in evening time one week later. In this way, students who work in the daytime may take their course in the evening, and vice versa. Further, of course, the person who misses a telecast or who does not understand the lesson completely may see the repeat broadcast a week later.

Evaluation: During the first year of the experiment, ten sections involving some 300 students each semester were used as control groups in the city junior college branches. These students together with their instructors viewed the live telecasts in the classroom, and then spent the remaining twenty minutes of the fifty minute period in discussion. There were an additional fifteen sections involving about 500 students taught by conventional methods, which were used as a further control. When mean grades are considered, the experimental group shows superior achievement in all subjects. Estimating the difference by using one letter grade difference as one standard deviation, the differences are about one-half standard deviation, or one-half letter grade. The same results appeared when the second semester groups' achievement was measured.

All enrollees in the television courses spent from 2½ to 3 hours in registration procedures, which included taking the Otis-Gamma intelligence test, plus proficiency and placement tests. The department of evaluation in the Chicago city schools is engaged in making

a thorough study of all results. The first report should be off the press and available in February of 1958.

Characteristics of the TV group: 59 per cent of the registrants are between the ages of 30 and 49; 6 per cent are under 21; 14 per cent are between 21 and 25; 13 per cent between 26 and 29; and 8 per cent are 50 or over. 24 per cent of the students are men; 76 per cent are women. The distribution of previous training follows: special students with less than four years of high school, 10 per cent; four years of high school, 65 per cent; one year of college, 14 per cent; two years of college, 7 per cent; and three years or more of college, 4 per cent. Intelligence test scores indicate that the TV group and regularly enrolled students are about equivalent in native ability.

TV student reactions: Questionnaires were mailed to the 1,364 students enrolled for credit in the first semester. 91 per cent said they would recommend the TV course to a friend if it were offered again. 87 per cent said they plan to take another TV course next semester.

Some of the other questions and replies: How well does your teacher anticipate and answer your questions? Almosts always, 47 per cent; sometimes, 43 per cent; seldom, 8 per cent; no response, 2 per cent.

How easily do you follow the plan of a lesson or the course? Easily, 51 per cent; with some effort, 41 per cent; with much effort, 5 per cent; no response, 3 per cent.

Do you take notes during the TV lessons? Almost always, 80 per cent; sometimes, 14 per cent; seldom, 3 per cent; no response, 3 per cent.

Tuition fees: The City Junior College charges no tuition fees to legal residents of the city of Chicago. Such students are required to pay only a general service charge of $5 for one or two courses, or $10 for more than two courses per semester. A non-resident of the city pays $14.06 per semester hour of credit in addition to the service charge. It is interesting to note that less than 4 per cent of the individuals enrolled for credit in the courses given during the 1956-57 session were non-residents, and hence paid tuition fees. A special committee of the Illinois Association of School Boards, Tri-County Division, is studying the situation preparatory to making a recommendation that outlying school districts give consideration to granting tuition scholarships to their citizens who wish to

take these courses for credit. Such fees would of course be paid to the Chicago Board of Education.

SOME ANSWERS

Is televised education effective? During the last five years, something over 100 articles have been written which reported research in this field.* A study of these reports, together with my own experience at Chicago, leads me to the firm conviction that for lecture and demonstration purposes television does at least as well as conventional techniques.

Can television save classroom space? In the Chicago Junior College experiment the television students appear on campus three times during the semester, once for registration and pre-testing, once for mid-term examinations, and once for final examinations. There are almost 15 thousand students in residence in five Chicago Junior College branches in the city of Chicago now. By 1960, this enrollment may be expected to increase to 20 thousand; by 1965 to 30 thousand; and by 1972 the figures may well have reached 40 thousand.† To house these additional students in new but conventional college buildings would cost the taxpayers something in the neighborhood of $50 million. If 20 per cent of them were handled by television (and I don't know why we should assume only 20 per cent) we could save over $10 million that we do not now have. It would be easy to take care of the registration and examination appearances of these students in existing school buildings in the evening or on Saturdays. It would even be relatively simple to arrange for quiz periods at certain intervals in the same manner.

Can television help increase the educational efficiency of our teachers, both in amount and quality of teaching? Open circuit broadcasts have only theoretical limits as to the numbers of students which may be reached, but these limits are very high. Credit enrollments last fall in Chicago were almost 600 full-time student equivalents. The teachers giving these courses in the conventional way carried teaching loads of fifteen hours a week reaching at most from 125 to 150 students each. Instructors assigned to grade papers and administer examinations to TV students obviously can handle many more students than could be handled by conventional classroom methods. Closed circuit work is limited only to the number of

* See Kumata, H. "An Inventory of Educational Television Research." Ann Arbor, Michigan, 1956.

† See General Superintendent Benjamin C. Willis' Report on the Chicago City Junior College, published by the Chicago Board of Education, May 23, 1956.

rooms which can be tied together by coaxial cable. Of course, there comes a point when a decision based on costs must be made among closed circuit, open circuit, or low power open circuit operations.

It would be difficult to argue that given two teachers of equal ability, the one whose total teaching load is only three half-hours a week on television would not do a better job than his colleague who had to carry on his lectures for 15 fifty-minute periods per week, whether it be for five different classes or even for five sections of the same class. Certainly we can find the best teacher from a quality point of viw to do the television work. Theoretically, of course, we can obtain the best teacher in the world and televise him from film recordings. We can also afford to pay better salaries to the teachers who are reaching so many more people. Further, the teacher should receive additional compensation when film recordings of his classes are used again during later semesters.

I estimate that to teach 900 full-time student equivalents in the manner of the Chicago TV plan, costs about the same as it does to teach a similar number in the conventional way on campus in the Junior Colleges, excluding only capital charges for buildings. However, additional students above the 900 figure will cost from one-tenth to one-ninth as much. This is a very high leverage, to say the least.

CONCLUSION

Manpower needs today demand that we explore means and methods by which we can increase the productivity of our available teaching staffs, both in *quantity* and *quality* of teaching. If this can be done by television, and I believe it can, then we also will be able to give the teachers what they should have: substantial increases in pay. Television offers the means of multiplying the audience of the teacher in lecture and demonstration work. I am convinced that the quality of instruction can be bettered. At the same time, by increasing class size for lecture and demonstration work, we can provide manpower for discussion and laboratory work which require smaller groups.

Physical plant requirements during the next decade are forcing us to increase building usage as well as to find off-campus space. Persons participating in the Chicago experiment are not occupying a single classroom in the City Junior College buildings, except when registration takes place and when examinations are administered. The character of our new college buildings may well be changed

as we proceed with new techniques of instruction, but I am convinced that the number of these buildings can be significantly reduced. With the use of television, building needs should be materially lessened. I am sure that the Chicago experiment will turn out to be a significant one in respect of the three basic problems which face us: *physical facilities, manpower,* and *quality of instruction.*

If the solution of these three problems can be accomplished partially by television, and I believe it can, then it remains to be seen whether we are resourceful enough and intelligent enough to discover these applications, and I believe we are.

What Television Can Do
For Teachers and Students

CHARLES HETTINGER
Supervisor of Television Education, Pittsburgh Public Schools

THE USES of television in the classroom are somewhat between the exaggerated claims of the enthusiasts and the dismal fears of the pessimists. Television is not a magic box which contains the answers to all educational problems and a formula for taking care of all educational needs of students. On the other hand, it is not a one-eyed monster which will hypnotize children into becoming passive automatons and push teachers from their jobs.

Various experimentations in the use of television directly in the classroom indicate rather conclusively that television has certain advantages as an educational tool. In discussing these uses of television, I will refer to various in-school television series done in the Pittsburgh area, telecast over educational station WQED, as I am most familiar with these programs and their use.

1. *Television can bring to the classroom certain courses which, for one reason or another, the school does not offer*

For example, three years ago WQED first offered a course in fifth grade French. There has been a growing interest in the teaching of foreign languages in elementary grades, but frequently financial considerations and lack of trained teachers have prevented widespread adoption. Television offers a means by which schools could present a first-rate course in an elementary foreign language to its students.

That first year, conversational French was taught daily over television by a teacher who spoke French natively, insuring the best pronunciation. The teachers in the participating classrooms generally were not trained in French and could not be expected to conduct a follow-up lesson. In a short time, however, every class was involved in some follow-up activity at the demands of the students. This follow-up was usually student-directed, with little monologues and plays and stories developed by the students, providing for more practice than possible during the television lessons. The teacher frequently acted only as a moderator for the activity.

This year, two courses in elementary-grade French are being offered three times a week: a beginning course for elementary grades

(suggested as grade levels 4-8), and an intermediate course for students who wished to continue for a second year with television French.

Speech improvement for kindergarten and first grade pupils has been another popular course offered over television for use in schools which have limited or no speech improvement activities. Many teachers of these grades feel the need for speech improvement work, but their lack of training makes such work impossible. These lessons have been put on kinescope (a special film for use on television). Although there is only one lesson a week, each one is shown five times a week, at a different hour each day of the week, making it easy for the classroom teacher to fit the television lesson into her schedule.

2. *Television can satisfy certain special needs of the schools*

Many school districts, for example, are unable to offer a course in high school physics because of the lack of trained teachers.

WQED telecast a series of daily half-hour lessons in physics during the school year 1956-1957. The course was taught by Dr. Harvey White of the University of California. These 162 lessons were recorded on film by Encyclopedia Britannica Films Inc. Now with a full year's work in physics recorded on film, schools can offer a complete course in physics by means of film or the rebroadcast of the films over television. This school year WQED is telecasting each film twice a day; a number of other educational television stations throughout the nation are also showing the films.

These televised physics lessons may be used in a variety of ways, depending the wishes and circumstances of the participating schools. Some schools without qualified teachers or laboratory equipment offer the television courses as the complete offering. Other schools schedule follow-up discussion and laboratory periods. Any student within the range of WQED or the other stations telecasting the films can have a first-rate course in physics, however limited the budget, the teacher supply, or the equipment of the school.

Similar series in high school chemistry and biology are in process of production and may be available next school year.

3. *Television can bring enrichment to a course already offered in the school*

A very popular series of lessons being offered over WQED is one in intermediate science. Many teachers of the intermediate grades have expressed a need for help in teaching science, feeling a lack of competence in that work. Outstanding science teachers present

lessons about the earth and the universe, matter and energy. Similar series have been developed in many areas: music, art, social studies, chemistry, nature study, Latin, literature and composition, etc.

The enrichment can go beyond the presentation of a first-class lesson. The television can bring outstanding guests and unusual experiences to the students. On a series of sixth grade daily reading lessons over television, the students met such people as a writer and illustrator of books, a member of the coast guard, an astronomer, newspaper writers, a television announcer, a ballad singer. They saw models of space ships and stations. They saw plays and puppet shows and animations. These brought to the students enrichment far beyond what could ever be offered in any classroom.

Many teachers and principals have stated that the chief value of television teaching is the opportunity to bring abundant enrichment to the pupils.

4. *Quality instruction can be spread in a broad base*

Dr. Dimmick, superintendent of the Pittsburgh public schools, has said: "Herein may well lie one of the great contributions of television, for the shortage in the schools is not one of teachers but one of able teachers.

When Dr. Harvey White taught a daily lesson over television, he was presenting a first-rate lesson each day to the participating classes. He taught only that one lesson each day, and to it he could give his full time and attention. He had access to whatever equipment or supplies he desired or needed. He had the cooperation of a full-time assistant as well as trained television workers. He was able to prepare the kind of lesson which many teachers know how to develop but are unable because of lack of time or facilities.

When a specially selected teacher has the opportunity to give full time to the production of one television lesson each day and has the assistance of several specialists, he can produce first-rate lessons. These lessons excel those of the average classroom teacher in such things as the employment of visual and enrichment materials, uninterrupted smoothness, clarity of presentation, and effective transition.

The same situation applied when WQED offered, during the last three years, daily lessons in fifth grade reading, fifth grade social studies, fifth grade arithmetic, elementary French, sixth grade reading, seventh grade English, and ninth grade general science.

5. *The television lessons can provide indirect in-service training for the participating teachers*

No matter how expert a teacher may be, he can learn through the observation of another expert teacher at work. Television provides opportunity for such observation, not casually on a few occasions during a year, but perhaps day by day for a full school year.

To a teacher who is not so expert, the daily observation of the television teacher can be as valuable to her as to her pupils. For example, an arithmetic teacher may have had little experience in the use of enrichment and concrete materials, may be unacquainted with the skillful use of the teacher's manual supplied with the arithmetic text, may have seldom used such devices as the fraction kits and the place-value chart. She can learn as she sees the television teacher at work with these devices and materials.

At this point, I should mention that all television teaching done in the Pittsburgh area has been done with the cooperation and assistance of a teacher present in the classroom. Provision is made for a portion of time for the use of the classroom teacher to conduct discussion, answer questions, provide for individual differences, and carry on drill and practice activities. For example, the television teacher of sixth grade reading is allotted twenty-five minutes each day for the presentation of the major portion of the lesson, the introduction of new concepts, motivation, etc. The classroom teacher has approximately the same length of time for her activities. The television lesson has not been intended, as prepared and used in the Pittsburgh area, to be an end in itself. Pre-program and post-program activities under the guidance of a classroom teacher seem to be important to the effectiveness of in-school use of television.

In all fairness, I must add that a certain amount of experimentation has been carried on in various parts of the country with total television teaching, which involved no pre-program or post-program activities under the guidance of a classroom teacher. The results of testing programs in these situations have indicated no significant difference in the learning as indicated by final testing between classes taught entirely by television and classes taught in the traditional manner without any use of television.

6. *Television can serve to stimulate the interests and activities of the students.*

We all recognize the appeal that television has for youngsters,

and we must all be aware of the tremendous numbers of things learned by children during their out-of-school watching. Little children who cannot cipher know the numbers of their favorite channels; they cannot tell time, but they know when their favorite programs are on the air. If you have any doubt about their learning, ask them to quote some commercials!

We do not wish to concern ourselves with a discussion about the merits of the programs they may watch during out-of-school hours, nor the effect they may have on the children. I merely wish to point out the fact that television has a tremendous appeal and is a medium which stimulates the interest of youngsters.

When one visits classes that have been using the television lessons, he sees a tremendous amount of materials and projects which develop as a result of viewing the lessons, concrete evidence of the stimulation and motivation of tht youngsters. The television reading courses have motivated substantial increases in supplementary reading and the writing of stories and verses. Librarians report an increase in the circulation of books among students as a result of the television viewing—rather than less, as has been frequently the direful prophecy.

7. *Television can act as a powerful means of public relations*

When parents can see what their children are being taught, and how, they become more interested in the schools. It takes the school to the parents. Conversational French has become a dinnertime practice in many Pittsburgh homes since WQED started telecasting French lessons.

Dr. Dimmick has observed: "The fact that these parents are following the education of their children more systematically than before is an interesting phenomenon, a sobering one, and, in my judgment, one that is good for the schools and the home."

8. *Television may extend the very schedule of the school day*

The Adult School of the Air, over WQED, provides systematic instruction for home study in selected subjects such as English, mathematics, social studies, foreign language, and science. High school credit is granted to students who pass examinations administered by the State Department of Public Instruction. Over 155 individuals, including inmates of penal institutions, have earned diplomas through this Adult School of the Air.

An area Summer School of the Air was inaugurated in the summer of 1955. Subjects offered are related to the incidence of high school failure because the summer school is authorized to operate

thus far only for the purpose of offering make-up work. At the close of the summer course, subject examinations are administered by an area school committee. The final evaluation of the work and the awarding of credit is the responsibility of each school district.

There have been some fears and some resistance to television as a medium for instruction in elementary and secondary schools. As more and more evidence piles up concerning the effectiveness of in-school television and as more schools are drawn into the sphere of television activity, these fears and resistances will disappear. Any medium which has the uses and advantages discussed is not one to be lightly dismissed or ignored.

There is no doubt that television holds an important place in the majority of American homes today. Perhaps tomorrow it will hold as important a place in the classrooms.

What Should Educators Expect of Television?

WANDA B. MITCHELL
Director, Television Project, Evanston (Illinois) Township High School

THE "post-sputnik" interest in science and mathematics, the President's proposal to aid education with scholarship funds, the crowded classroom, and the needs within the teaching profession itself have only served to make the public aware of what educators have known for some time: the need for the reappraisal and evaluation of teaching methods, of curriculum, of facilities, and of results. Educational television is only one of the areas being examined for its capacity to aid in this crisis.

The negative claims against television as a means of instructing pupils cannot be ignored. There are fears that an electronic machine may be substituted for the classroom teacher. Television, say some, can assist with only one small part of the learning situation: imparting knowledge or content; it cannot change attitudes or develop appreciation. Television, say others, can do nothing that a good teaching film, properly used, cannot do better.

On the other hand, the number of research projects reported in Dr. H. Kumata's *Inventory of Instructional Television Research* suggests that educators are sincerely seeking valid, documented data to guide their use of this medium of communication with the realization that it is just that: a medium through which either good or bad teaching may be transmitted, true or false information can be disseminated, challenging or boring ideas can be explored, ignorance or wisdom can flow.

Present evidence seems to indicate a few generalizations upon which educators can safely build their program:

1. Television can give every student a front row seat, bring students closer to the teacher and closer to objects. Army research indicates that televised instruction is very effective for explaining complex manipulations. South High School in Columbus, Ohio, uses television in the physics class to make charts and meters visible to those in the entire laboratory. Evanston (Illinois) High School fastens the camera to the microscope to magnify the picture of bacteria to the size of a 31" television screen. This same school uses the camera for magnification during the dissection of the frog and the grasshopper in biology classes.

2. Television can enable a teacher to handle larger groups; therefore, more students can benefit from the instruction of a superior teacher. At the University of Houston one professor instructs 800 students in biology. At Mt. Pleasant High School in Schenectady one teacher of advanced mathematics is made available to three sections of trigonometry and solid geometry by the use of television. By the use of television two senior typing classes are taught simultaneously by the chairman of the department at Evanston. At this same school the television camera makes the best teacher of poetry available to 120 seniors at the same time.
3. Television can enrich the learning situation and supply the classroom with otherwise inaccessible instructional aids. For example, teachers of the history of Iowa have the assistance of live interviews about many of the historically significant spots around the state, staged in front of rear projection slides presenting the actual scene in realistic pictures. French is offered to grade school children in Pittsburgh. A new orientation course for freshmen is offered at Stephens College. Teachers in Washington County, Maryland, received supplementary aid several hours a week from their closed circuit television studios in Hagerstown where a teacher devotes full time to the preparation and presentation of audio-visual aids, research material, dramatic and colorful units. Teachers in remote areas can "tune in" materials in art and music.
4. Television can provide uniformity where uniformity is desirable. If instructions for a standardized test are administered by one qualified person on television, a more uniform atmosphere can be created than would be possible when each teacher in each room gave the directions. When New York City gives tests for principals, the candidates observed the same schoolroom situation on television and for the first time in history are answering questions on the same learning situation rather than on several different scenes staged in different classrooms. Any classroom teacher who has explained how to write a term paper for five consecutive periods can see the advantage of presenting this information once for distribution by television to the five groups simultaneously.
5. Television can assist with the redeployment of teacher time and effort for more efficient utilization. For instance, when an Evanston High School teacher teaches three sections of English during one period, the two periods thus saved are used to have personal conferences with the students and to go over their papers with them. The team teaching made possible by television enables an instructor to present on television the units in which he is best prepared and best qualified while his colleagues have more time to prepare the units they will present. Students profit by the best teaching of a team of teachers.

6. Television can extend education beyond the walls of the school. Pittsburgh's high school courses are studied via television in a prison. Kinescopes of these same course are used by the Army overseas. Television provides home study courses for credit at Chicago Junior Colleges, Western Reserve, New York University, Michigan State, University of Omaha, and Iowa State, to mention only a few.
7. Television can help with many non-instructional duties and thus free the teacher for the rewarding job of guiding boys and girls in a wholesome learning environment. Chicago Teachers College has saved one-third of the time required for registration by focusing a television camera on class cards so that students waiting in line can see immediately which classes are filled. A TV camera focused on the office records of any student enables any teacher to see those records without leaving her room and without removing those records from the files. If the evils of "Big Brother" can be controlled, supervision of parking lots, cafeterias, and study halls can be handled by television.
8. Television is an effective instrument for teacher training. No teacher is so good or so experienced that he cannot profit by observing the masterful teaching of an instructor who has been freed of all other responsibilities and who has the assistance of graphic artists, directors, and visual aids to make his lesson as effective as possible. TV cameras in an elementary classroom, remotely controlled by a college instructor in a teacher-training class, enables the class to observe a live teaching situation under the guidance of their instructor without disturbing the classroom situation. Kansas State Teachers College, Pittsburgh, Kansas, and University of Minnesota's demonstration high school are two institutions using television in this way. Kinescope recordings of teaching and learning situations provide real material for evaluation and improvement. Evanston High uses a beginning teacher as the supervisor in the typing viewing rooms where she can observe the masterful teaching of the department chairman and at the same time gain experience in classroom management. Iowa State televises a special art education course on Saturday mornings as in-service training for elementary school teachers without their having to drive to the campus each week.

Instructional television is not a threat to teachers; it is a challenge to our imagination, our creativity, our ingenuity in adapting this medium to its proper place in the entire learning process. Television cannot and should not try to do everything in every subject matter area. The role of television in art is different from its role in Spanish. Its role in the elementary school is different from its role in a college. Its role in a small rural school is different from its role in a comprehensive urban school.

One thing is certain: educators dare not ignore television. Dr. Kenneth Bartlett, of Syracuse University, says: "Commercial television has proved it can sell *products;* educators must use television to sell *ideas.* Commercial television has proved it can motivate people *to buy;* educators must use television to motivate people *to think.*"

A School System Looks at Educational Television

ROBERT P. CURRY
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IN 1951 THE IDEA of educational television was little more than a dream in the minds of a few enthusiasts in the field of audio-visual education. Today, educational television has attained deserved recognition as a promising means for enriching and supplementing the programs of our nation's schools. In this period of approximately six years the investment in educational television has grown from practically nothing to an estimated sixty-million dollars. This fact reflects the rapid and astonishing growth of educational television on a national scale.

Educational television in this short period of time has won many supporters and many critics. To some persons eucational television represents the greatest development since the invention of the printing press. It is not surprising, then, that to these persons, educational television is the key factor in the solution of many of the critical problems of education including teacher shortage, lack of physical facilities, and adequate salaries. There are those who disagree. To them television is a menace to the freedom of the teacher and the learner. Television is a menace, for example, because it provides at best, a restricted kind of education or, at worst, results in the kind of control that is in direct opposition to some of the established principles of learning.

Until we in education can come closer to an agreement about television or, at least, agree to examine it without prejudice, it should be viewed as potentially one of the promising methods of instruction. It has been recognized as an efficient and effective instrument by commerecial interests to use in reaching large segments of the population. In this sense, television has been established as a powerful means of communication. As yet, however, it can be classified only as a potentially promising method for direct instruction in education. It has not been fully demonstrated that television can be used as a principle means of instruction to provide better education.

It is suggested, then, that educational television is not the answer to all of our problems. Unfortunately, this attitude reflects to

some of the more ardent supporters of educational television a lack of courage, or imagination, or both. We simply have not learned enough in these few years to assess accurately the true values of this means of instruction. We should also refuse to believe that television will be used as a detriment to the schools, for there is no evidence to support this belief. Then, too, we should never underestimate the sober judgment of parents, educators, and pupils who are interested in improving the character and quality of instruction in our nation's schools.

It is highly important, however, that we in education examine closely and objectively the functions of television before we assume it can, or cannot, result in a better instructional program, or help solve any, or all, of the problems we face. Television should be evaluated in terms of the several purposes it serves:

For Adult Education.—In the realm of adult education, television has tremendous possibilities. It may well be that television will allow us to raise materially the educational and cultural level of large numbers of people. Television may be the instrument that will allow us to grow culturally in much the same manner as increased skill and production has resulted in economic growth.

For Enriching and Supplementing the Instruction Program.—Television has much to contribute to the teaching of boys and girls because it can supplement and enrich their program of instruction. Television, for example, can reach many pupils by representing authorities, or specialists, who could not possibly visit hundreds of classrooms but who can participate in one or more television lessons.

For In-Service Education.—Television also can play a most important part in the in-service growth of teachers. This is important at a time when fully trained teachers are in short supply. The use of television here is obvious because television makes it possible with a minimum of effort to demonstrate simultaneously good teaching practices to large groups of teachers.

For Direct Instruction.—The fourth, and most controversial, use of television is in direct instruction. Direct instruction implies that a television teacher provides all, or a substantial part, of the instruction. He either replaces the classroom teacher or, in cooperation with him, provides all of the instruction in a given subject matter field. It is here that proponents see the great value of educational television and the solution of many of our pressing problems. It is possible that the unusual interest in television is

caused to some extent by the development of television at the very time that we are faced with many serious problems. It is in direct teaching, also, that the critics see the greatest danger to the continuation of sound instruction. Finally, it is in direct instruction that television must prove its worth because few school systems can give the financial support necessary unless television can be used successfully for this purpose.

If the primary interest in television is in the areas of direct instruction, it is pertinent to evaluate what has been learned in the past few years. Briefly, the studies and reports include the following:

1. Television is admittedly a far cry from the Mark Hopkins idea of education, a teacher on one end of the log and a pupil on the other. This idea was never designed for public school use, however, for we deal with groups of pupils, and always have. There are not now, and never have been, enough good teachers for the Mark Hopkins type of education. Neither could any school system afford it.
2. The evidence we have of the success of direct instruction is not great. It is a fact that many programs have been produced, but it is also a fact that few have been evaluated systematically and thoroughly. But the evidence so far available does indicate that the pupils in both the elementary and secondary schools learn as well, and in certain cases somewhat better, by television than they do under regular classroom conditions. This is based upon achievement alone, as measured by objective tests.
3. At this point much of the objective evidence ends and judgment, opinion, and prejudice begin. Teachers and pupils, for example, comment favorably about the flexibility of television and the ability to present many interesting, and, at times, complex demonstrations to pupils. They also comment, by way of further example, unfavorably, about the lack of give and take among pupils and teachers, the inability to adapt instruction to the varied interests and abilities of large numbers of pupils, and the difficulty of pacing instruction to an unseen, and perhaps, inattentive audience. But objective evidence regarding these aspects of direct instruction by television is lacking.
4. Finally, there is the fear, unexpressed in most instances, that automation has reached the classroom and that a mechanical

device will replace the teacher. This fear varies from that of the loss of a job to the fear that education will revert to a restricted and regimental kind of instruction.

The important question is where do we go from here? It is good to know that pupils seem to learn some things as well by television as by regular classroom practices. It is equally important to remember that the problem of teacher and pupil acceptance cannot be dismissed solely on the basis of achievement as measured by tests. We need both good achievement and acceptance of the medium if television is to find its proper place in education. It is now up to us to learn how we can best use both television and regular classroom techniques to improve instruction. Pupils need to acquire the skills, understandings, and appreciations that are of paramount importance, and, at the same time, retain the important relationships with their teachers. In order to do this we need to examine television without prejudice. It is suggested that basic to this examination is the acceptance of the following conditions:

1. It is necessary to recognize that television is here; that we face a fact and not a theory. The issue is not whether we shall have television, but if we shall have educational television and, if so, how television best can be used in education.
2. There is need for far more evidence as to its effectiveness in the total instructional process. Too often, research has been an afterthought to experimentation in educational television. We need to plan experiments in which a true relationship exists between performance and evaluation.
3. There is need for studies in which we use all of the imagination and resourcefulness at our command so that the advantages of both instruction by television and by the teacher in the classroom can be revealed. In this process we need to measure as best we can, not only the achievement of pupils, but the less tangible aspects of pupil growth as well.
4. Finally, we need to involve teachers and, to every extent possible, pupils and parents in these studies from the very beginning in order to develop and sustain real understanding of this means for improving instruction.

It is quite possible that we will learn to use educational television in a variety of ways in the total learning process. It is possible that the total effect on education will be more than the

obvious one of providing a new means of instruction to reach large numbers of pupils. For example, television is an exacting master in that many hours must be devoted to the preparation of each television lesson. Television may well cause us to re-examine what is being taught and the manner in which it is being taught. In the future, it may well be that improvement of instruction will be television's major role in education. It may help us to do better what we are now doing well. If this is so, and if we as a nation view the tremendous growth in enrollment as a precious asset rather than a calamity, television ceases to be an end in itself but rather an important means for sustaining and improving the high quality of instruction in our nation's schools.

What Television Might Do for the Schools

C. Fred Kelley

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FLYING SPUTNIKS, soaring birthrates and teacher shortages have finally caused concern throughout the nation about the job confronting American education. Many of our national leaders now want educators to act quickly to meet the challenge of Soviet scientific advances. This challenge calls for more than merely putting "new wine in old bottles" but changes in the school program—decisive steps, if necessary, for survival in this atomic age.

Whoever claimed it takes fifty years for a new idea to influence American education must not have lived during this time when television is being used in many schools and colleges. In operation last year were 136 closed-circuit television installations in our schools plus 24 educational television broadcasting stations. By the end of this year, it is predicted there will be 42 open-circuit educational broadcasting stations in operation. It is safe to say today over thirty thousand college students are receiving part of their instruction by television. Moreover, much more attention is being devoted to public schools teaching which presents the core of many subjects televised on a daily basis. This enriched television teaching is then followed-up by the classroom teacher who builds on this instruction and assimilates it with his students.

There are many open-minded educators using open and closed-circuit television to educate a greater number of pupils. An experiment that appears particularly significant is being conducted in the state of Nebraska. The University and the State Department of Education in Nebraska are using television plus correspondence study to reach the smaller rural public school systems not staffed or equipped to offer all high school subjects. (The year before last only four percent of our high school students throughout the country had as much as one semester of physics. Looking at Russia's educational system we see that Russia today offers a universal system which includes five full years of physics.) Nebraska, using open-circuit television, broadcasts seven subjects including Spanish, geometry, and physics. This year's program capitalizes on the experience gained last year when beginning algebra was taught by television-correspondence study in six-small

rural high schools to about 110 pupils. On the basis of standardized achievement test scores, the pupils in the experiment performed "slightly better than students of equal ability in the control schools who received instruction through regular classroom procedures."

Oklahoma's television project covers a broadcasting area of about ninety miles. As in Nebraska, they are using television as a means to get good teaching and subjects to rural high school youngsters who in the past did not have the opportunity to receive these courses because of the geographic location of their schools. Through this use of educational television our nation would be reaching a heretofore untapped source of talent. This seems more significant in light of the fact that Russia is producing two and a half to three times as many scientists and engineers as we.

In Norfolk, Virginia we are experimenting teaching plane geometry, American history, and general science to classes of larger than normal size ranging from 75 to 200 pupils. This use of direct television teaching combined with "follow-up" classroom instruction creates a teaching team that works cooperatively to raise the quality barrier of instruction. The studio or television teacher is released full time to prepare for the half hour daily telecast. The follow-up or classroom teacher performs an equally important role and he is experimenting with new teaching techniques for working with large groups. Such devices as lavalier microphones and over head projectors are being tried plus recent psychological research findings concerning large groups. A new job classification, teacher assistant, has been created. The student involved, in fact, has more than one professional teacher concerned with his rate of learning. The "teaching team" strives to bring him the best quality of instruction locally available.

Without question, with television, we have found the best way yet to present visual aids and rich resources of the community to classrooms. The "classrooms" in most cases are lunchrooms or music rooms that before were only used part of the school day. In two situations we have utilized space and kept the schools involved from going on double-shift sessions.

In conclusion, this national experiment, of which Norfolk is one of ten major cities involved, warrants close examination because of America's very critical shortage of teachers. Following World War II we became concerned about the problem of teacher shortage. Our country knew larger and larger school populations

were on the way because of an increasing birthrate. Today, ten years later the teacher shortage is worse than ever. It is estimated we need 135,000 more trained teachers at present and unless something unforeseen happens ten years from now, the situation is going to be worse than it is today. I do not begin to contend television will solve this critical situation or that instruction by television is going to eliminate the necessity for having a teacher in the classroom but rather, with the use of this wonderful medium, we could have more dynamic schools than we have had in the past and better capitalize on the talent available.

Tryout for T.V.

ARNOLD PERRY
Dean of the School of Education, University of North Carolina

ALTHOUGH television has been in use in many homes for ten years or more and in some public schools for almost that long, it has not received a real tryout in the public school systems until this year. Undoubtedly television will greatly influence teaching in our public schools and colleges. The growth of direct teaching by television, however, will be largely dependent upon the outcome of a number of experiments now under way, the chief of which is the National Program in the Use of Television in the Public Schools, sponsored and supported in part by the Fund for the Advancement of Education. The most important part of this experiment got under way with the beginning of the 1957-58 school term when experimental projects in direct teaching by television were started in the cities of Atlanta, Cincinnati, Detroit, Milwaukee, Norfolk, Oklahoma City, Philadelphia, and Wichita; in the county systems of Dade County Florida and Jefferson County, Kentucky; and in state programs in Nebraska, North Carolina, and Oklahoma. These programs are designed to test the effectiveness of television as an educational medium and will involve tens of thousands of pupils, hundreds of teachers, and many administrators in elementary, junior and senior high schools.

It has been estimated that more than 25 million dollars has been spent on experimental programs or will be spent by the time current programs are completed. No experiments in the history of education have been so extensive and so likely to result in findings which may alter teaching procedures in our public schools and colleges.

Experiments in the cities and states mentioned and several projects in other places are testing many aspects of teaching. First, educators want to know if teaching by television has as much quality as "live" teaching. The question is being asked, "Aren't we losing something of great value when the person actually doing the teaching is not there in the classroom in the flesh?" "Is not the television teacher cold, impersonal and distant?" Reports from students who have had many days of teaching by television indicate that the instructor on the T.V. is not a ghost, but a person with

whom they soon identify. They feel that they have a front row seat and even personal attention because the receiver gives the illusion of bringing the teacher up close to the student where he is being talked to directly. Classroom teachers using television as an aid to instruction report that there is improved attention on the part of students and that there seems to be better than average retention of what is presented over T.V. Many say that pupil interest has been heightened and that spontaneous discussion takes place following telecasts. Students seem to be eager to react to the T.V. presentation, to give individual interpretations of what was seen, and to express approval or disapproval of points that were made. All in all classroom teachers who use the medium consider it a great motivating force.

Because the teacher in the classroom can be multiplied by use of T.V. receivers any number of times at relatively little cost, many school boards are looking at the possibility of T.V. teaching in their efforts to meet rising costs. They see that there is a limit to the number of good teachers available and wonder if the superior services of the very best cannot be televised and sent to hundreds of students who might otherwise miss the better instruction that our "top-flight" teachers can give. They see that one superior teacher's effectiveness can be made available to each group of twenty or more for an investment of as little as $175 for a television receiver. Furthermore, they see that larger classes are possible with television than with the regular classroom arrangement. Many are looking carefully at experiments now under way which place a hundred or more students in a large room with a half dozen or more television receivers placed at convenient points so that each pupil is near a set. Use of such large groups, they feel, will not only make the expert teaching of the studio teacher available to a larger number of pupils, but will also free certain other teachers for the greatly needed guidance services, remedial services, and recreational leadership wanted in so many communities. Some educators and laymen believe that the number of teachers now required for a given number of students may be reduced without any reduction in the amount or quality of learning on the part of pupils.

Subjects being taught by television in the high school grades include American History, World History, General Science, Biology, Physics, General Mathematics, Algebra, Plane Geometry, Spanish, and Driver Education. In the elementary schools Science, His-

tory, Music, Art, Conversational Spanish, Health and Safety, and Physical Education are included in the experiments.

Over a period of a year or more very careful appraisal will be made of the teaching done by T.V. in comparison with teaching done in conventional classroom situations. Such appraisal is being carefully planned so that reliable conclusions may be drawn. In some cases T.V. sections are being paired against regular sections and conclusions are drawn from the data gathered from administration of a variety of standardized tests and other instruments designed to measure pupil learning. In other cases very large groups of students taught by T.V. will have their achievement gains measured and compared with national norms of groups taught by conventional methods. In the early phases of the program measurement will be very largely centered upon the learnings which are most easily measured objectively. Later the more difficult appraisals will be made of such outcomes as attitudes, habits, appreciations and critical thinking.

If the results achieved show that teaching by television is equal to or better than conventional classroom teaching, it may be expected that large numbers of school systems will enter into programs which provide T.V. lessons in all of the classrooms. At the present time most pupils are receiving a minimum amount of T.V. In the North Carolina experiment which embraces 19 school systems and nearly 8,000 students, no student receives his teaching by T.V. for more than 30 minutes a day. Not many schools at the present time go much beyond this. The outstanding exception is Washington County, Maryland, where something over 12,000 pupils in 14 schools are receiving some of their lessons by television from the Board of Education Studios in Hagerstown. School-owned facilities in that system provide for four television lessons to be broadcast simultaneously over a closed circuit system. This is the second year of a five-year experiment. Results to date indicate that pupils receiving their instruction by T.V. are learning faster than pupils who are denied this medium.

The advent of T.V. brings with it many problems for school administrators and teachers. Optimum use of the new tool may require some change in the design of school buildings. It will certainly result in some modification of programs of professional education for teachers. Furthermore, there will be new demands for instructional equipment. Teachers-in-service will be forced to revise their methods of instruction and administrators will have to

learn new ways of scheduling, new ways of assigning staff so that teachers released from routine teaching may give more attention to guidance, remedial work and enrichment programs. When school rooms are as well equipped with television receivers as some people envision, and when a considerable part of the pupil's teaching comes to him from a central studio, we shall probably develop a "star" system of teachers very much like the "star" system in Hollywood. This means that there may be teachers who are so good over T.V. that they can command salaries as studio teachers several times higher than the best salaries commanded by classroom teachers today.

We have considerably more research evidence with reference to the use of other audio-visual aids in teaching than we have in the case of television. Such evidence as we have tends to show that the use of audio-visual aids in teaching adds meaning, increases interest, stimulates self-activity, promotes vocabulary growth, and makes learning more permanent. T.V. nor any other electronic or mechanical aid, however, will ever be a cure-all for the ills of the classroom. Television certainly will not transform a dull, incompetent teacher into a master teacher. It can never do things which are beyond its scope and function such as pupil-teacher planning, making of individualized assignments, or providing for a "meeting of the minds." The T.V. will never fully recognize individual differences nor make a valid appraisal of the total change taking place in an individual. These are the jobs of the classroom teachers who must learn to use television as an aid in teaching to be supplemented by their professional skill in preparing, planning and appraising.

Some teachers feel that television will go the way of radio and sound motion pictures. "After all," they ask, "what has television got that the sound educational motion picture doesn't have?" Actually, it has nothing except, perhaps, *immediacy* which in some instances may be of questionable value; but television does have other advantages which indicate that it is here to stay. First, it presents no mechanical obstacle for the teacher. She simply flicks a switch and the picture and sound are there. In the case of sound motion picture many teachers are defeated before they can ever get started. First, there is the problem of darkening the room. Few rooms are properly equipped for blackout. Furthermore, when the room is darkened a problem of ventilation is usually created. While the room is dark, of course, students cannot take notes. There is also

the problem of setting up the projector, the speaker, and threading the film through a maze of mechanical gears that baffle some teachers. Also there is the noise of the projection machine to contend with which frequently is so great as to require turning up the speaker volume to a point where the sound disturbs teachers in nearby rooms. Even if ideal projection arrangements are provided, there is still the problem of getting the film to the classroom on time, using it and getting it returned to the film library. All of these problems are solved automatically in the case of T.V.

T.V. will accomplish more in the hands of a teacher who knows how to use it than it will in the hands of a teacher who allows pupils to use it simply for desultory looking and listening. As in the case of all audio-visual aids, adequate preparation must be made for the telecasts. Purposes must be established. Leading questions must be asked. Study guides must be provided and assignments must be made in advance. If optimum benefits are to be derived from telecasts, the teacher must provide an atmosphere of purposeful looking and listening, and an effective follow up must be made of each telecast with adequate discussion, review of main points, and testing when necessary.

At the present time television for direct teaching is still in the experimental stage. We need to give it a fair chance. Some authorities have said that it takes fifty years for a new idea to permeate education. Others have said that we can speed up this process. The coming of television gives educators a splendid opportunity to prove that they are not suffering from "hardening of professional concepts" and that successful innovations can be fully introduced in considerably less time.

Teaching the Missouri Constitution

CLAIR R. TETTEMER
Director of School Programs, St. Louis, Missouri

KETC, the St. Louis educational television station, now telecasts programs for classroom use six and a half hours a day, five days a week during the school year. This is the fourth year that school programs have been telecast in the Greater St. Louis area.

To find out how television can help the teacher in the classroom, a system of teacher planning committees has been evolved. One of the first committees formed decided there was a definite need for a television series in the social studies area.

Missouri, like many other states, has certain special subjects required by law. Among these is the teaching of the Constitution of the United States and of the State of Missouri. The law requires that there shall be regular courses of instruction in these two areas, and such instruction should begin not later than the beginning of the 7th grade and should continue in high school. The law also requires the teaching of American history, including the study of American institutions. Although no student shall be graduated until he passes an examination on the provisions and principles of these required subjects, the law does not contain any provision for supplying materials in these areas to teachers. Since the limited market for texts on the Missouri Constitution is not particularly attractive to authors, publishers, or teaching aids producers, there is little material available to the teacher. However, the committee's investigation indicated adequate text and materials in all other required areas. From this information, it was decided to assign a high priority to the planning and production of the Missouri Constitution series.

As a first step, a special committee of classroom teachers who had been teaching this subject was called together. The planning of the program series was turned over to them. Several major questions emerged from the committee's discussions. First, just where in the curriculum could television help the teachers and students most? Courses of study from the many school districts in the KETC area were analyzed. The committee decided that the series should be planned for use after the students had studied the United States Constitution. In this way the television lessons could build

on what the students had learned about the functions of government. In most courses of study the Federal Government is taught in the seventh grade, but, of course, the exact placement of the series would be the responsibility of the using classroom teacher. Classes could use it profitably in either the 7th, 8th, or 9th grade.

The next major question was how much of the instruction would be covered by the television teacher and how much would the classroom teacher be expected to cover. To answer this and other questions, a series of two pilot programs was planned. Each program was designed to investigate different problems. The pilots were to be telecast during school time. A group of some forty classroom teachers was invited to use these programs with their classes. The program outlines were turned over to the KETC school program producer. The first step was to select a teacher to appear on the pilot series. Principals and supervisors were asked to recommend outstanding classroom teachers to do the television teaching. Ten teachers were suggested. Each of the teachers was interviewed and invited to take an audition. Eight accepted. The eight teachers were briefed on the objectives of the series, the methods to be employed, and were asked to prepare a ten-minute sample program. Cameras were reserved for two audition sessions and each teacher was scheduled for one of the periods. An audition panel consisting of social studies supervisors, consultants, and the production staff of KETC observed these auditions. Even though the teachers had been recommended because they were excellent classroom teachers, there were differences in how their presentations came through the television system. The paned selected Mr. Paul Andereck from the Affton Junior High School, Affton, Missouri, as the teacher to do the program. Mr. Andereck had a superb background for this assignment. He was junior high school social studies and speech teacher, who had taught the Missouri Constitution for several years and had an extensive audio-visual background.

Mr. Andereck and the program producer met to plan the pilot series. Since the committee had raised several questions to be checked during this series, the committee was consulted on each step of the planning. The members were not certain how much the television series would cover. Should it teach the entire Constitution or just the more difficult points? The first pilot program was planned to cover a section of the Constitution in its entirety. The second program also covered a complete section, stressing only the points judged most difficult and these in considerable detail. The

pilot programs were telecast on succeeding Thursdays during school hours.

Of the forty teachers who had been invited to use the programs with their classes, more than half of them helped in the evaluation. Between twenty-five and thirty teachers came to the KETC conference room for a discussion following the second pilot telecast. It was important to know what happened in their classrooms and to have their reaction to the series before further programs were made. The group was enthusiastic about the pilot programs and the possibilities of the series. They gave constructive criticisms, and their evaluations told what was needed to make the series fit the classroom needs better. It was decided that it would not be necessary to teach the entire Constitution. The teachers wanted the series to concentrate on the points that were difficult for them to teach. A list of these points was made and from that outline the entire series was developed. It would consist of twelve twenty-minute programs to be telecast two-a-week, completing the series in six weeks. To fit the series into the school program telecast schedule, it was decided to follow another suggestion and produce two programs reviewing the history and geography of Missouri. These would be scheduled the week preceding the first Missouri Constitution television lesson. In this way a teacher could select six or seven weeks of programs depending on whether she wanted to include the review program. To allow the teachers the maximum leeway in scheduling, the series was kinescope recorded on film. Since the programs would be telecast two-a-week, a Monday-Thursday and Tuesday-Friday schedule was arranged. In addition, each program was to be repeated four times a week, the entire series being telecast twice each semester. A typical schedule is shown in Figure 1.

FIGURE 1. Schedule of "Missouri Constitution" telecasts
Station KETC—Channel 9, St. Louis, Missouri

Fall Semester—1957

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
9:15 A.M.	Program No. 1			Program No. 2	
10:35 A.M.		Program No. 1			Program No. 2
2:10 P.M.	Program No. 1			Program No. 2	
2:35 P.M.		Program No. 1			Program No. 2

The entire series of fourteen programs was then outlined and individual program scripts were prepared. The bulk of the lesson planning was done by the television teacher. Following the detailed outlining of the programs, the producer began reworking each script with the television teacher. The producer's job was to make the lesson plans into television lessons. The scripts were completed. Necessary props, visuals and other production devices were gathered. Special film clips were made and the setting constructed during June and July of 1956. The programs were produced and recorded in August and September of that year. The entire series was televised four times during the 1956-57 school year and was used by more than 600 classroom teachers. At the same time that the programs were being planned and produced, study guide materials were prepared and printed. These study guides were distributed during the first week of school to all teachers requesting them.

During the first showing of the series, several small errors in production or in content came to light. Teachers who had agreed to evaluate the entire series called these to the producer's attention and as fast as the errors were uncovered, new portions of the program were produced and inserted in the film.

By the end of the 1957-58 school year, the series will have been used eight different times. Since each program is repeated four or five times, it will have been telecast thirty-six times. After two years of experience with the series the teachers using the programs have pointed out certain problems in pacing, content and production. The process of evaluation is a continuous one. At the present time the original planning committee is reviewing the films and evaluating each lesson. The results of their work will show up next year. From their recommendations an entirely new Missouri Constitution series is being planned. The same television teacher will be used, but the entire concept of the series is being revised. Certain sections of the Constitution will receive more attention. There will be extensive use of film clips, interviews, and demonstrations. The entire series will be telescoped into a shorter span of time. Even six weeks is too long for most classes. The need for such a series is still there. Hundreds of teachers are using the series as an integral part of their class work. Some of them use the series as a supplementary aid to their own Missouri Constitution unit. Others use it as their entire teaching unit. A good many

youngsters have passed the examination after having received only the television instruction.

To plan and produce programs like this takes hundreds of man hours spread over a year's time. Committees have been working since the fall of 1957 on series to be presented during the fall semester of 1958. Both the school people in the St. Louis area and the staff at KETC believe this is the way to produce instructional television programs. In May 1957 the Missouri Constitution series was awarded a first place in the Ohio State University's annual exhibition of educational television programs. To the hundreds of people who help in the planning, production, and evaluation of the KETC school programs, this was not only an award to those who worked on the Missouri Constitution series but also the extensive system which has been designed to produce school television programs.

UNIVERSITY SCHOOL OF EDUCATION LIBRARY

TV and Science

ASA S. KNOWLES
President, The University of Toledo

IF EDUCATORS who believe in the potential of educational television will capitalize on the events of today, they can give a big assist to their nation's need for more scientists and at the same time give a significant boost to greater use of ETV for improving the quality of teaching in our schools.

Dr. Margaret Mead, noted anthropologist and author, writing in Look Magazine, reports the results of a pilot study conducted for the American Association for the Advancement of Science on what high school students think about science and scientists. She says, "An analysis of their answers shows that there is a nationwide image of the scientist among students. That image is overwhelmingly negative whenever the question becomes one of personal contact with science, involving the choice of a career or a husband. Even the positive image of very hard and responsible but only occasionally rewarding work holds little appeal. While it is respected, its requirements are seen as far too exacting."[1]

Charged with the responsibility of keeping the United States in the front vanguard of leadership in science, Dr. James R. Killian, President Eisenhower's Special Assistant for Science and Technology, says, ". . . Scientists have an obligation to make this true character of science better understood and to do so, not by arrogant advocacy of science and technology as the only means to increase our understanding and well-being, but by the balanced and tolerant presentation of the scientific spirit as one of the great and powerful methods by which man can increase his knowledge and understanding and still remain humble and ennobled before the wonder and majesty of what he does not understand."

The role ETV can play in interesting youth in science and possibly in science careers is stated succinctly by Miss Bess Barg, Radio-Television Assistant in the Philadelphia Public Schools:

"The impact of recent scientific developments and discoveries upon the daily life of every individual, upon the standards of communities, upon the very future of civilization makes science more than an accumulation of facts, more than a method of investigation.

[1] Mead, Margaret. "How American Youth Sees the Scientist: The Dangerous Godless Brain." Look Magazine, Jan. 21, 1958.

Science is a dynamic social force. . . . In many ways the television programs can enrich the activities of the science classroom. It is more than an audio-visual aid. It adds to the media of sight and sound the unique qualities of timeliness and reality. It has developed to an astonishing degree the techniques of the personal appeal, the 'man-to-man' relationship that creates a warm flow of sympathy between the viewer and the performer. The guest scientist appearing on the television screen in the classroom is sharing his talents and experiences with the students. His interest in them, at that very moment, is evident in his every movement, his every word. He's alive and real and his concerns at the moment are their concerns. Their emotions as well as their minds are stirred."[2]

Teachers are proceeding slowly in the adoption of television as a tool of teaching. Many take the stand that ETV can do no more than can be done with motion pictures, slide projectors, visual aids already available and so on. Many are unwilling even to give ETV a try, yet they may spend hours at home watching TV programs and even recommend to their students that they view certain programs which they recognize as having educational value.

Educational television still is in the experimental stage; it is scarcely five years old. We need a great deal more information on how it should be used as a tool of education. However, it seems obvious to those who have had experience in teaching via ETV that it has the potential for making a great contribution right now in the field of science teaching. The ways it can contribute are these:

(1) Bring real life to science teaching.

Margaret Mead, in her report on the attitude of youth toward science and scientists, says, "Too much emphasis has been placed on the kind of science that deals with dead things—rocks, cut-up animals, inhabitants of dead cities and famous dead men—and too little on how scientific imaginations are nourished by watching living things and by learning to understand how children grow and how people think and feel and live together."[3]

There are many examples of the way television can and does bring science to life for every age level. The series called *Discovery,* released by the Educational Television and Radio Center at Ann Arbor, Michigan, and consisting of programs for the 9 to 15 age group, uses living animals, models, and illustrations to show the phenomena of nature. *Mr. Murgle's Musee,* a series produced at WKAR-TV in East Lansing, explains the wonders of the world to youngsters through the fascinating art of puppetry coupled with exhibits of all kinds. In *Science in Sight,* a KETC, St. Louis pro-

[2] Barg, Bess. "The Science Telecast in the Classroom." *Education, October,* 1953, Vol. 74, p. 88. The Palmer Co., Hingham, Mass.
[3] *Ibid.*

gram, the child learns about everything from fossils to telescopes and electricity through the combination of film strips, artifacts, and demonstrations brought into the studio. *The Magic Mascot,* produced by the Toledo Public Schools for WSPD-TV, achieves tremendous mail response from its 5 to 10-year-old viewers through its presentation of elementary science, mathematics and other subjects.

ETV has also come into its own in teaching by another means. Closed circuit television gives the sciences a new life and vitality within the school's formal education pattern. The Hagerstown experiment has included science and mathematics in its curriculum taught via TV. Case Institute has been successful in teaching engineering drawing by this method. The University of Toledo has been teaching biology to larger groups at a time by closed circuit with good results for the student. Living organism under the microscope, animals in their own environment seen on film, and demonstrations by the professor with living animals have helped the student toward greater understanding of biological functions.

(2) Improve the quality of science teaching.

ETV (both closed and open circuit) is finding its greatest support among those teachers whose courses lend themselves to demonstrations of equipment, processes and methods. The lecture-demonstration telecourses in chemistry, physics or biology bring students closer to the instructor. Each student has a better view of what the instructor is doing than is the case when demonstrations are performed at the instructor's desk in the regular manner in front of a large class. With TV each student has a front row seat! In biology the camera can be focused into the microscope so that the entire class sees the same specimens at the same time, thereby contributing to the effectiveness of the instruction.

In teaching the more abstract subjects, such as mathematical relationships, some instructors are turning to dynamic cartoons—a medium of education which holds the attention of the student while dramatizing the subject matter presentation.

The most spectacular illustration of the use of TV in education right now is the introduction of the color camera to the hospital operating room. Not one, but hundreds of medical students can "look over the shoulder" of the surgeon as he performs an operation, getting an intimate view of techniques—a close-up not possible in any other fashion.

Students in a freshman class in biology at the University of Toledo were queried by another professor about their reactions to a TV course in zoology. One freshman remarked to the teacher, "How else could one teach this course except by use of television?"

Schools having TV studios equipped with a Kinescope (equipment for recording live broadcasts on film) in reality have their own motion picture studios. Knowing that a telecast can be recorded on film, an instructor can afford to spend a great deal of time to perfect his demonstration experiment. When recorded by Kinescope record-

ing for future use, the instructor is saved the time he otherwise would spend in preparing apparatus for separate demonstrations in several sections of the same class or several classes in successive years. This time he can put to advantage in doing a better job of presentation of his subject matter and in working with students. Moreover, students may view the demonstration as many times as desired and thereby gain greater understanding.

(3) Bring science instruction to more schools.

Events in the present day world are giving emphasis not only to the importance of improving the quality of teaching science and mathematics in our high schools but also to recognition of a need to find ways to bring more science instruction to more high schools in the nation. This has focused attention of many educators on the possible contributions which television can make in achieving these objectives. TV is seen by some as the only solution for those schools in rural areas which have neither science laboratories nor competent teachers in many fields of science and mathematics.

By increasing the kilowatt power of television stations which are now broadcasting to schools in the urban areas, hundreds of schools in the area outside the cities could profit greatly from the courses already being offered and others which might be offered in fields of science and mathematics.

(4) Motivate more youth to undertake science as a career.

If TV is used properly in teaching of science, it can be used to motivate interest of students in a science career. It will mean little to have a teacher stand in front of a camera and talk or do what he normally does in the classroom. TV provides an opportunity for reorganization of subject matter, the introduction of new teaching techniques and visual aids, to the end that the course or program is "produced." Wherever this is done the report is that the quality of teaching is improved, interest in learning is enhanced, and the time requirements for instruction are shortened.

Motivation of interest as well as quality of instruction in science could be enhanced if schools would pool ideas, facilities and talents to offer superior programs in a given area. Daily courses might well feature a number of teachers in an area, each handling a separate part of the subject matter, and making the best possible presentation after completing exhaustive research on the subject. Courses taught in this manner could be exciting as a Hollywood movie because they would be produced and designed to attract and hold the interest of viewers. They would certainly motivate greater interest in science as a career on the part of students now in school.

Interest in science could be promoted also by encouraging high school students to design, write and prepare television programs which they themselves might produce with proper guidance. Development of demonstrations which illustrate solutions to scientific problems could be promoted as contests for all pupils in a certain school, town or area. The award for those pupils who work out

the best demonstration would be the opportunity to present the winning demonstration via television to all pupils who took part in the contest or possibly to all pupils in a given school.

Science instruction via ETV already in progress.

There is today a great deal more experimenting in the televising of courses than most educators appreciate. The National Educational Television News, which presents bi-monthly digests of information on ETV broadcasting and experiments in schools throughout the country, reports that 13 educational television stations are offering programs primarily designed for classroom students in elementary and secondary schools. In addition to programs mentioned previously, specific programs reported by N.E.T. News[4] are: teaching of 9th grade General Science and high school physics over Station WQED, Pittsburgh; offering of General Science and 8th grade arithmetic over Station WUNC-TV, Chapel Hill, N. C.; offering of physics, trigonometry, algebra, geology and chemistry to some 150 students in 30 high schools by KETV-TV of Oklahoma City in cooperation with the Oklahoma State Department of Education. Seven hundred students in 22 Nebraska high schools will receive instruction in science this year over Station KUON-TV, Lincoln. The course offerings include both mathematics and physics.

These educational telecasts include only a few of the science programs and courses being offered via TV. Many schools now have closed circuit TV equipment and are attempting to discover how TV can enhance the quality and quantity of instruction.

Science TV courses for "in-school" use.

There is a growing interest on the part of ETV stations as well as educators in developing more courses for our schools. Thus far most of the professional programming over ETV stations has been aimed at adult audiences. Important as this is, the ETV station is going to be devoting more and more time to "in-school" courses and high on the list in these times will be the sciences and mathematics. Teachers who attend college Television Workshops become thoroughly aware of the potential of TV in teaching. They learn to prepare scripts, to produce a course or program, and then learn how to operate the equipment in order to get the most effective results. As more teachers become aware of the potential of TV for improving the quality of teaching as well as enriching courses in schools, TV courses and demonstrations will become a familiar

[4] N.E.T. News, September-October, 1957, p. 2. (Educational Television and Radio Center, Ann Arbor, Mich.)

part of the program of education of all schools. Some educators are so convinced of this that they feel no school building should be constructed today without complete equipment for use of television in classrooms and laboratories.

Writing in the American Journal of Physics on the practical aspects of presenting a course in physics by television, Alan T. Wager of Arizona State College, says:

"Experience, during recent years in particular, indicates that there is a tremendous interest in science as such during the grade school years and that this interest wanes in many people during the adolescent and teen-age period. During the teenage period in particular, one must conclude that only those who plan to make some field of science their life work continue to maintain this earlier interest. Later in life, as a person matures, that earlier interest in science often revives. (Parents of eight to twelve year old children are often harassed by their questions on science and related fields.) These youngsters and mature people want to learn about the things of science; the challenge faced by the TV teacher is that of inducing such persons to learn science.

". . . In this type of program, demonstrations are all important. Youngsters in particular like to watch things happen; if, in addition, somebody explains carefully what is going on, they become really captivated. The amount of information they retain is often startling. Adults also respond very favorably to a well-explained, simple, and clear demonstration."[5]

This is a time of crisis when our nation recognizes the need to encourage more of its able youth to enter upon careers in science. This is an objective which in itself is of sufficient importance to command our best efforts. Even more important, perhaps is the bringing to each child a greater understanding of science, its relationships to the individual and the world of today. This is the age of science—an age when the welfare of the human race, its security and freedom, must depend in large part upon leadership in science. ETV if properly used opens new horizons both to motivate interest of youth in science and to enhance the effectiveness of science teaching.

[5] Wager, Alan T. "Elementary Physics Course Presented over Television." American Journal of Physics, Vol. 25, No. 1, January, 1957.

It's Time to Blast-off on ETV

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JUST as you can lead a horse to water but you can't make him drink, so can you lead an educator to evidence but you can't make him believe.

At least that seems to be the situation concerning educational uses of television—BY SCHOOL PEOPLE, that is. Commercial people, on the other hand, have read the evidence and are acting on that evidence in a mighty big way. Commercial people no longer question; they KNOW that television can teach!

For it is nothing more nor less than teaching—the development of attitudes, knowledge, and skills, for particular commercial products, of course—that is the basic goal of commercial television.

The evidence of the effectiveness of teaching by television for commercial purposes is not questioned by Procter and Gamble, the soap company which usually spends more money on television than any other organization—nearly four million dollars—*a month!* The effectiveness of TV is accepted by the 155 companies which spent more than $50,000 EACH last year for station identification announcements *only*—buying, mostly, brief ten-second messages for a total of nearly forty-seven million dollars!

The evidence of the power of teaching by television is recognized by the men in the gray flannel suits of the Young and Rubicam advertising agency, which last year placed some seventy-four million dollars of television teaching—for commercial products, of course. Why, the makers of dog food, bird seed, and related items spend more than six million dollars a year on TV!

Or, as a grand total, advertisements wrote checks for $1,255,000,000 for television last year alone—and all that money was spent, simply, to educate the viewer about what he should buy.

Do these fabulous sums of money produce results? Are people "taught" to use certain items through television? Ask the manufacturers of Revlon whose unknown lipstick zoomed to the top favorite of the nation in but a few months—via television teaching. Check with the maker of flavored drinking straws and he'll tell you about his experiences of having to quit TV teaching about his product while he built a gigantic new plant to handle the orders

which came pouring in after but a few "lessons" on television. Or, ask—ohhhh, ask almost anyone who uses commercial television intelligently, and you'll get a big, loud, "YES—TV does teach people about my product!"

Then, ask similar questions of educators. Ask most classroom teachers, elementary, high school, or college, academic, general education, or vocational, and they'll almost always express doubt about teaching on TV.

Now this is no plea to sell education like soap, or to present a class in history like a drama of the old West, although I'm not convinced that these wouldn't be "good teaching" techniques.

But rather, I'm concerned with the fact that despite sufficient notice in newspapers, magazines, and books, both popular and professional, most educators still do not know the facts of life about educational television. They don't know what's been on and what is on television, they don't know what research has proved about teaching on television, and they don't know about the extremely low cost of teaching through television.

Last year alone, more than four hundred high school and college courses were offered on television. Classes from every university department have been presented on television for regular academic credit. Through television students have studied opera in Los Angeles, political science in Chicago, psychology in New York, Shakespeare in Houston, and income tax, dog training, biology, creative writing, salesmanship, foreign languages—the list is truly impressive, in both extent and in variety, as this brief summation indicates.

In commercial programming, for the English teacher there are shows such as "Omnibus," Twentieth Century," and "The Last Word." For the science teacher to use in connection with his classroom presentations there are programs such as "Mr. Wizard," "Geophysical Year," and "Johns Hopkins." For teachers of many other subjects there are many other pertinent, stimulating, vital programs for enrichment.

"So," says the educator, "They've put classes on television. But how do you know they teach anybody anything?"

The parallel of commercial television's successful teaching of buyers should be sufficient evidence to answer that question. But there is even more direct proof.

More than fifty times across the nation tests have shown that students learn just as well via television as in regular traditional

class situations, other things being equal. In some classes, some students do even better than the desk-bound student.

But still skepticism prevails among most school people. "What about personal contact?" they ask. "A teacher's got to be face-to-face with students!"

Do they? I'm a teacher, and I guess—I GUESS, that is—that this must be so—that personal contact must be maintained. They told me it was true when I was in teacher-training. I've read it in many an educational article. I've heard it argued loud and long, both by university deans and by menial laborers. Even some of my students have told me it's important. Yet the fact remains that there is no concrete, specific, scientific, objective research to confirm or to deny the significance of personal contact in teaching.

Sure, personal contact must be important for certain subjects, certain students, certain teachers. But without evidence, without measurement, without research, it is at least possible that this personal contact is not as important in all courses as many would believe. The basic point is, however, that we need research.

But still I'm not sure that research will really help solve the problem of education's hesitancy to use television. Because, there IS research—extensive and impressive, objective and valid—on a great many other aspects of teaching, and yet much of this evidence is ignored.

The value of audio-visual materials is well-established through research. Television is simply another kind of audio-visual aid—probably the best all-around aid yet developed. Television will not replace teachers, any more than textbooks replaced writing, educational films replaced reading, or informational recordings replaced discussion.

Research has established the validity of the following seven claims for properly used audio-visual materials in teaching:

They make the things students are studying—

1. More concrete, specific, definite
2. More real, life-like, factual
3. More interesting, vital

They develop—

4. Growth of meaning, understanding
5. Continuity of thought

They make learning—

6. More permanent

They are—

7. Efficient

Who says so?

No one less than Dr. Edgar Dale of Ohio State University, Dr. James D. Finn of the University of Southern California, and Dr. Charles F. Hoban, University of Pennsylvania, in the *Forty-Eighth Yearbook of the National Society for the Study of Education.* In reaching their claims for the value of such tools, they reviewed all of the significant research in the entire field.

"But, this TV is expensive," the educator fights back. "All those figures you gave on commercial TV proves that! And schools just can't afford to spend that kind of money."

I say that schools can't afford NOT to spend such money.

Just how expensive is commercial television?

$320,000 per show was the price-tag on last season's most expensive series, "Producer's Showcase." That figure includes the production costs of talent, writing, scenery, and such, but does *not* include promotion, audience analysis, commercials—OR the cost of air-time.

One hour of network air-time last season cost a little over $100,000.

Just for comparison, consider the price of some other shows. A quiz program such as "Twenty-One," goes at $30,000 per airing. A variety show such as Perry Como's runs about $108,000 per week. And again, these are production costs only.

BUT—and here is the key to the entire problem—the knowing sponsor, when presented the bill for such programs, does not gasp in shock at the total figure, if, indeed, he even gives it a second glance. What he does want to know is how much the program costs *per viewer.*

Let's assume we're sponsoring a middle-bracket national network television show, costing a grand total of $150,000 per week. A fair-sized audience for such a program would be about 30,000,000 viewers. Simple division reveals that we're paying only half-a-cent per viewer!

Now, how expensive is educational television?

For $350,000—the production costs of just one of the top commercial shows—we can build a really good, complete station, equipped to telecast practically every type of educational program.

To operate our station for a year, another $150,000 would provide effective, imaginative programming with a competent staff of directors, writers, and technicians.

There are 256 television channels reserved for educational purposes only in the United States. Only twenty-nine of these are now on the air. It would cost a total of $113,500,000 to build an educational television station on each of the unused channels and to operate each one for an entire year. But, let's look at that figure as the commercial people do—computed on a per viewer basis.

The latest Census Bureau report is that there are 41,200,000 students enrolled in schools and colleges. Our dream of educational television could become a reality for about $2.75 per student—just about the cost per student of a year's supply of pencils and paper!

Now add in the millions of adults—more than one million in California alone—who are taking in-service training, company advancement courses, specialized adult education—and the cost of educational television per student for a complete system throughout the entire country, built and operated for an entire year, would be about the cost of one trip to the movies!

On December 30, 1957, President Eisenhower approved a billion-dollar program of federal aid to education, designed "to improve education in the high school," according to the Associated Press releases. Just a little more than ten per cent of that program would pay for building and for operating for a year every one of the available educational channels.

The President's action was, of course, Sputnik-inspired.

But—educators still question. "How do we know that education by television works?" "What's going to be telecast?" "What about personal contact with students?" "How much will it cost?" "Can we afford it?"

Well, the evidence, the facts, the techniques and the procedures are known, and these are being strengthened through additional knowledge gained in the limited educational programming now being presented.

But I'm concerned.

How much more evidence is needed before education adopts some of the effective and applicable techniques of modern communication, enterprising industry, progressive business—and, today's beginnings of tomorrow's inter-planet travel?

TV Helps Teachers

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University of North Carolina

TELEVISION is being used in more and more classrooms as a part of the regular school program. Out-of-school programs supplement instruction in the classrooms. Adult education is aided by means of television. Public relations programs have and are helping interpret the work of the schools to the community. Teacher education institutions have been working with various means of aiding teachers, both in the pre-service preparation and in in-service education. Television is doing much to aid in this work.

The educational television station of the Consolidated University of North Carolina, WUNC-TV, in cooperation with the School of Education of the various branches of the University, has presented programs dealing with a number of these areas. *The Younger Set,* an after-school viewing program designed to supplement classroom instruction, was the original program sponsored by the School of Education at UNC. This was a part of the original program series beginning January 8, 1955, and continued throughout the spring semester. In the fall of 1955 it was decided to include programs designed for in-school viewing, a means of enriching the curriculum by bringing specialists to many classrooms at one time. These included programs on science, health and physical education, music, geography, and vocational guidance. An additional series, *Know Your Schools,* was presented in the spring of 1956 and throughout 1956-57. This was a program designed to interpret the work of the schools to the public.

With the exception of the *Know Your Schools* series these programs were designed specifically for student viewing and would be considered in the area of enrichment of the curriculum. Some felt that teachers could be aided by the expansion of in-service education programs by means of television. Most schools have such a program, usually conducted by an administrator or supervisor. The series, *Play Period,* a physical education series, includes features of in-service education in that teachers learn how to conduct the activities while the studio teacher and students demonstrate them. The instructor of this program sends out materials to the various schools to help them with their participation in the pro-

gram. Administrators have indicated that these are very helpful for their teachers.

The Television Advisory Programming Council for School-Related Programs was appointed by the President of the Consolidated University of North Carolina upon recommendation of representatives of the School of Education. This committee is composed of superintendents, principals, teachers, supervisors, State Department of Public Instruction personnel, and staff members of the School of Education. WUNC-TV officials serve as advisors to the committee. This group planned a series of programs to be presented during the year of 1957-58 which is called *Methods for Modern Teachers*. The committee selected areas and topics on the basis of interest and a felt need for this type of discussion. The areas covered include the following: Health and Physical Education, Health Screening of Students, Audio-Visual Aids and Their Use, Science, Children's Literature, Language Arts, Music, Use of the School Library, Social Studies, Art, Mathematics, Exhibits of School Activities, Speech Correction, and Records and Reports. There are from two to five programs in some of these areas, depending on the topic. Some feel that more time should be devoted to a few areas rather than trying to cover such a wide range. However, the committee felt that the original series should be broad in scope.

The *Methods for Modern Teachers* series is presented at 3:30, Wednesday afternoons, and is a half-hour program. This time was chosen because it was felt that most of the schools in the viewing area ended their day's programs at that time, especially the elementary schools. The usual plan which is followed for the utilization of these programs is for the faculty members to meet in a viewing room, sometimes a classroom, sometimes a library, or other places where the television set may be available. The principal or supervisor in charge will introduce the topic and then the group will watch the telecast. This is then followed by a discussion of the topics by the faculty members. If there are questions which cannot be answered at the meeting they are sent to the studio and forwarded to the person who was in charge of the program. It is obvious that there would be areas presented which would be of interest to elementary school teachers but not to secondary school teachers and vice versa. However, there are some programs which were of interest to both groups, such as audio-visual aids. The administrator or supervisor decides which program should be included in the programs of in-service education. Sometimes re-

freshments are served and the faculty meeting takes on a rather informal air. One supervisor reported that the teachers in her school system met at various teacher's homes following the school day in order to view these programs. She felt that it was a very enjoyable as well as educational experience.

This type of in-service education program is new and its effectiveness is still measured in terms of reports from individuals using the programs. These have been very favorable. A survey is being conducted in the spring of 1958 to determine the extent of the use of this series and the opinion of staff members as to how they may best be served by bringing specialists to their schools by means of television. At the present time indications are that this program should be continued and expanded for 1958-59. This information should be very valuable in planning future programs.

While a reading specialist, for example, could meet with only a limited number of faculty groups during the year, he can present a program by means of television which will be received in many schools and viewed by hundreds of teachers. Of course, there is a limited amount of personal contact in this method, usually through correspondence. However, the widespread contact by TV seems to outweigh this disadvantage.

Such a series as *Methods for Modern Teachers* should be carefully planned in order to insure as effective presentation of the discussion as possible. Visual aids can add much to the effectiveness of the program. Resource people can present various aspects of the topic under discussion. As in most television programs for educational purposes, the introduction and follow-up activities are of major importance.

Methods for Modern Teachers is strictly an in-service education series and does not carry college credit. It may be desirable to modify this program to make it into a course but that could mean limiting the content to fewer areas. On the other hand, quite a number of courses have been offered over WUNC-TV which are credit courses. Some of the first courses presented were a part of correspondence courses and the students completed the regular correspondence lessons. The courses are now independent and have their own written assignments and tests as would be the case with a campus or extension class. Some of the courses which have been offered include Growth and Development of the School Child, Philosophy of Education, Maladjustment Among Children, and Contemporary Issues and Trends in American Education. Other

fields have been represented including: Political Science, Elementary German, Origin and Significance of the Bible, North Carolina Literature, and The Story of Western Painting, to mention only a few.

The North Carolina In-School Television Experiment sponsored by 20 participating school systems of the state and Fund for the Advancement of Education, involves the teaching of four junior and senior high school subjects by means of television. Studio teachers teach a course for one-half hour. This is viewed in the classrooms by large groups of students. This presentation is then followed, or in some cases preceded, by class activities of various kinds, including discussion, projects, and other classroom activities under the direction of the teachers. The usual plan is to have two or possibly three teachers in this large class to work with these students. Classes range in size from 96 to 220. The studio teacher has a wide range of materials and has the advantage of the use of specialists from various fields of work. It is estimated from reports sent in requesting study guides that there are at least 3,000 additional students watching these programs in their regular classroom, although their schools are not official participants in the project. A relay arrangement has been made through commercial stations to extend this coverage over almost all of North Carolina and into parts of Virginia, Tennessee, and South Carolina.

From a teacher education standpoint administrators have pointed out that they feel that their teachers benefit from working in the project and observing well-prepared teachers with excellent teaching facilities and materials.

The shortage of adequately prepared teachers is being stressed in all areas. Administrators report the problem of securing teachers who are fully prepared. Many face the problem of employing teachers with substandard certificates. Teachers who do meet all certification standards and who are competent and well-prepared for their work are also eager to continue to learn more in their chosen field. The good teacher is interested in in-service education just as the good doctor or lawyer continues to learn of new practices and methods. Therefore, there is a definite need for in-service education. This is not new; it has been recognized for a long time. Summer schools, professional meetings, inter-school visitation, travel, and professional literature are all features of in-service education. *Methods for Modern Teachers* is an attempt to add to this program. Credit courses by television are other means of extend-

ing educational opportunities to many teachers in scattered areas.

Television is becoming one of the best known media of communication. In a period of ten years it has grown until it now reaches a large part of our population. Recent reports indicate that over 80 per cent of the homes of students in many areas have the benefits of television. Whether it is used to its fullest extent in the educational process depends upon parents and teachers in their guidance of student learning. Such programs as *See It Now, You Are There, Voice of Firestone, Omnibus, Wide, Wide World,* newscasts, and the many special programs can furnish educational experiences which would not be available to teachers for their students in any other way. This indicates the need for teachers to know of these programs and be as up-to-date here as in a knowledge of current happenings as reported in newspapers, magazines, and on the radio. This is all a part of the guidance of learning experiences of students.

When the first television programs were presented in 1947, many thought of television as merely entertainment, but even then the televising of special events made it possible for teachers and students to view events of historical importance which were occurring many miles away. In ten years time the extent of these opportunities has expanded greatly through the increase in station coverage, improved techniques of communication, and the increase in the number of television sets. Color TV will add even more. Educational groups and institutions are recognizing this opportunity to help teachers with the job of educating boys and girls. It may include teacher education, enrichment of the curriculum, direct teaching, or interpretation of the work of the schools to the public. In any case, TV Helps Teachers.

Educational Television Challenges the Principal

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WHETHER the task is one of awarding diplomas earned in a sequence of television courses as in Pittsburgh, Pennsylvania,[1] where a state high school diploma may be earned in this manner, or one of finding adequate space for the television class in a small rural high school in North Carolina, new concerns are here to stay with the school administrator. Problems of space, equipment, curriculum, personnel, professional growth, and public relations rise up to challenge the principal and superintendent as teaching by television gains momentum in our schools.

Principals who are working with educational television in their schools for the first time point out that many of their problems arise from a lack of experience with this relatively new medium of instruction. It is obviously true also that in school systems large enough to employ more specialized personnel the principal is less likely to be involved personally in making necessary changes than the principal in the smaller system who handles most of the administrative duties alone.

The school principal's responsibilities in educational television fall into three main categories: Administration, including organization; instruction, including personnel; and evaluation. These of course are interrelated, and all are more or less interwoven with public relations.

ADMINISTRATION

One of the first tasks the principal faces in planning for educational television is to find suitable classroom space. To find a classroom large enough to accommodate comfortably perhaps a hundred or more pupils is no easy task in a day when large study halls have virtually disappeared. The four large rooms common to most schools are the library, gymnasium, auditorium, and cafeteria. Of these the library and gymnasium are normally in constant demand so that their regular use by the television class would seriously hamper the total school program. Most auditoriums suffer from a lack of lighting of sufficient quality for note taking. Few

[1] Elaine Exton, "Television at Work in the School," *American School Board Journal*, June, 1957, p. 70.

provide flexible seating or tablet arms for writing. Most cafeteria seating is only as flexible as group tables and chairs permit, and few cafeterias have acoustic properties and lighting conductive to optimum use for classroom purposes, let alone television classes where audio conditions must be excellent and light adequate but without glare. A classroom with proper lighting and acoustics, adequate wiring, and a seating capacity of more than one hundred flexible enough to permit groups of 25 to 35 pupils to watch separate television receivers and then become a single group under the direction of the classroom teacher is indeed a rarity in all except the newest of school buildings. In very few instances will any room the principal selects for the television class not need some major remodeling.

A second large hurdle is that of adapting the daily schedule of the school to that of the broadcast. Except in closed circuit television, the school, not the broadcaster, may have to do the adapting. In one nearby county, schools are operating on at least three different daily time schedules. The educational telecast comes on at the beginning of the class hour in one school, leaving 25 minutes for discussion after the broadcast but no time for warm-up. In another the program falls in the middle of the class hour, leaving a short period both before and after the telecast. The third operates on a schedule of four 73-minute periods weekly for each subject taught. This school has to interrupt the regular schedule with an odd 30-minute period or else miss every fifth broadcast. At the same time the high school supervisor is enthusiastic about the longer period for the television class because more time permits fuller discussion and additional related activities. Hence we see that both the conventional and the staggered schedule may present administrative problems in fitting television into the schedule.

Major innovations call for the support of an understanding and sympathetic board of education. Not only may both reorganization and remodeling be needed, but also at least a minimum of equipment must be available. The school board must pass on these matters as well as make whatever policies are needed in support of the new program. Initiative in obtaining appropriate support rests with the administrator. As one of the initial steps, the board of education, guided by the principal and his staff, should establish a tentative policy and make it known throughout the school system and the community. This policy not only should be tentative but also flexible. What it should contain depends on local plans. Cer-

tainly it will include a point of view on television as an instructional method, staffing, equipping, evaluating, and provision for subsequent change as modification becomes necessary.

INSTRUCTION, INCLUDING PERSONNEL

As instructional leader in his school, the principal may have responsibilities far more complex than the purely administrative ones already mentioned. Not all teachers and not all pupils are receptive to the idea of teaching or learning by television, and the principal may face a major task in seeking to bring about a climate favorable to the use of television in even a single course.

In schools which use two teachers in the television class, one serving as assistant to the other, it will be necessary to find two teachers who work well together without either personal or professional conflict. Not only must the efforts of the classroom teachers be in harmony but their work also must be synchronized with that of the studio teacher. If, as some indicate, the studio teacher is selected because he possesses certain qualities such as skill in research, showmanship, or acting ability in addition to superior teaching qualifications, it would be easy for the classroom teachers to suffer by contrast with the studio teacher. The different roles of the teachers involved must be clear, and there must be security for each in his role, if optimum performance is to be expected.

Experience may reveal the desirability of using new criteria in the selection of both studio and classroom teachers for educational television. Can the teacher stand the tensions involved in wondering whether the equipment will fail, or whether the students are really getting the ideas? Is he versatile enough to make sudden adaptations in his teaching? Can he gear his teaching to the telecasts? Can he guide and evaluate television learning and the many related activities? Affirmative answers to these instructional questions must be provided by the principal either through selective hiring or in-service education.

Until more colleges are ready to prepare teachers for television instruction, in-service education will be a major school responsibility. Only by sitting down and working together over a long period of time can the classroom teachers and the studio teachers reach satisfactory agreement on the most beneficial use of telecasts. How much of the telecast should be devoted to fundamental facts and how much to enrichment, for example, are problems to be solved by mutual agreement so that learning time will be used efficiently.

With any innovation in education much needs to be read and

studied before teachers are prepared to try it out. The alert principal will pay early attention to the development of a professional library in the field of educational television. Through reading, teachers can profit from the experience of others and thus avoid pitfalls. Even the skeptic may be led to experiment with the new method, and intelligent decisions on how and when to use telecasts may be guided by reading. At the moment periodical literature is a fruitful source of information as educators begin to write about their early experiences with TV teaching.

In a few instances, as with classroom films, the principal may have to prevent the misuse of television in classrooms where the equipment is readily at hand. The temptation to watch an interesting presentation even though the class has not been prepared for it, or the telecast does not fit the curriculum at this precise point may be great, but even educational television can waste precious learning time if it is misused. Indiscriminate use of television will soon convince the public that we have indeed come up with a "frill" in education.

EVALUATION

The newness of television as an instructional medium makes it difficult for the principal and his staff to evaluate its use in the classroom; yet it is important that so tempting a method for school teaching be examined thoroughly.[2] If it is proved valuable, plans to increase and improve equipment, facilities, and the use of telecasts can be initiated; if it is proved no better than other good classroom instruction, unwarranted further expenditures of time and money can be stopped.

Since television learning is through the eye and the ear, standards of evaluation applied to other audio-visual devices may be adapted for use in measuring its effectiveness. Nevertheless, a carefully worked-out plan for evaluation should be prepared and thoroughly understood by all who will be affected long before the first program is shown.

What, then, must the administrator or supervisor look for in evaluating telecasts as they are used in the classroom? Space limitations permit little more than a listing of some of the important elements that need careful scrutiny. The first question seems to be what effect the television "lessons" have on the pupils, especially upon their learning. More specifically:

[2] Franklin Dunham, Ronald R. Lowdermilk, and Gertrude G. Broderick, *Television in Education*, U. S. Department of Health, Education, and Welfare, Office of Education, Bulletin 1957, No. 21, p. 29.

1. Does the television lesson enliven the interest and increase the desire of the pupils to learn?
2. Has it improved their understandings more effectively than previous instructional methods?
3. Has it increased the factual learnings of the pupils more effectively than other techniques?
4. Has it improved important aspects of instruction such as motivation, demonstration, skill building, other?[3]
5. Has the absence of a two-day exchange of meanings—i.e., teacher to pupil, and pupil to teacher—limited the effectiveness of telecasts as a medium of instruction?[4]
6. Has television instruction had the tendency to make pupils passive viewers, or have the real-life experiences of the pupils ultimately been enhanced and increased?[5]

A second area of evaluation concerns the effect of the television-lesson plan on parents, teachers, and the program of instruction. Means of determining answers to the following questions will be needed:

1. Do the classroom teachers feel that the effectiveness of their teaching has increased as the result of combining TV instruction with it?
2. Have the television lessons stimulated the professional and technical growth of the teachers?
3. Have the teachers felt secure in their positions as classroom leaders of instruction? (The excitement of the television lesson may make previous procedures seem dull and prosaic regardless of their relative effectiveness.)
4. Have television lessons become an accepted and integral part of the instructional program, or have they tended to disrupt its pattern and unity?
5. Have the pupils become more discriminating viewers of other programs? Have their tastes in television programs improved?[6]
6. Based on their observations of their children, do parents favor the use of educational television?
7. Have public attitudes toward the schools changed because of the use of educational television in the schools?[7]

[3] Exton, *loc. cit.*, p. 45.
[4] W. B. Levenson, "School Public Relations Through Radio and Television," American School Board Journal, September, 1957, p. 70.
[5] Erna Christensen, "Television—Friend or Enemy?" *Children and TV*, Association for Childhood Education, Bulletin No. 93, 1954, p. 5.
[6] *Ibid.*, p. 38.
[7] Donald G. Tarbet, "Know Your Schools—by TV," American School Board Journal, September, 1957, p. 46.

8. Is the cost of equipment and operation commensurate with the gain, if any, in instructional efficiency?

Unless answers are found to these questions, damage may be done to the staff and the public relations of the school. Inaccurate surmises upon insufficient evidence may stultify what otherwise could have resulted in a marked advance in instructional efficiency. The principal and the teaching staff simply must know the effects of so revolutionary a development as the use of educational television in the classroom.

Numerous indeed are the administrative problems to be solved if educational television is to make its optimum contribution to teaching and to learning. Many there are already, though, who are convinced, even with limited experience in teaching with television, that its efficacy as a teaching method makes the inherent administrative problems worth the cost in time, money, and effort that it will take to solve them.

What Is Television Teaching?

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THE USE of television as an instrument of formal education is an established fact. The extent of its use in this field, the size of television classes, the most effective subject-matter adaptation, and the relationship of television teachers to classroom teachers are still matters of speculation and experimentation. Television being a dynamic instrument, and education being a dynamic process, it is probable that such speculation and experimentation will continue for a long time to come, and will produce a great many new ideas and effective techniques in the field of teaching.

It can be reasonably stated, however, that television holds no threat to the professional teacher. It is not a substitute for teaching, but an instrument for teachers to use in proportion to their ability to master its techniques. It can be an instrument of much more effective teaching, or not, depending upon how well teachers and educators generally understand and use it.

Television teaching can be used in many ways in the modern school. It can provide teachers for many in subject-areas where there are no teachers, such as Mathematics, Science, Music and Art. It can provide educational services which are not now being provided in many places, such as Kindergarten, accelerated subjects for advanced students, etc. It can bring inspiration and enrichment into the daily class schedule with the cooperation of the classroom teacher; and it can relieve teacher and classroom shortages without lowering the quality of instruction.

Television teaching, however, is not just an extension of classroom teaching into the studio. It requires special techniques and understandings. Perhaps the most important beginning is to understand the relationship of television to teaching.

Television is not just another audio-visual instrument. It is true that it contains all of the aural and visual elements of the standard audio-visual instruments used in the modern classroom; but it is more than these. It contains additional and vital elements which belong to it alone. There is the element of immediacy. Television can bring "live" occurrences into the classroom as they are happening. It can combine "live" presentations with aurally

and visually "recorded" presentations. It can bring important details of a presentation or demonstration to the intimate view of the student. It can cover great distances of space and time with the teacher in perfect control of such travel. It can focus and impact important high lights and key concepts; and it can react widely separated thousands as easily as it reaches one. In these things television is unique.

Of course, television cannot accomplish such miracles by itself. It is not an automatic system of education; nor is it a new system of education. Television, for all of its unique advantages, is just a better method of group communication. It is an instrument of intense-focus, high-impact communication to be used by teachers according to their ability to understand and master its techniques.

Television offers a great potential of effective communication to a competent teacher, but the realization of this potential demands certain disciplines and efforts which extend far beyond the traditional teaching experience.

The good Television Teacher should understand the medium philosophically, as well as technically. It should be understood that teaching is essentially a matter of communication and that television is an instrument of high intensity communication. The nature of communication, especially interpersonal communication, should be understood.

Dr. Wilbur Schramm, one of the leading authorities on communication, says simply that communication is the effort to establish a "commonness" with some one of information, an idea, or an attitude.

Professor Philip H. Phenix of Teachers College, Columbia University, who has given a lot of study to academic communication, says that the essence of communication is "the recognized re-creation of meaning."

In these statements both men basically are saying the same thing. Both, in their writings, offer masses of evidence of the nature of communication, but fundamentally it all boils down to these statements.

All published results of study in the field explain the basic nature of communication as the accomplished fact of transferring some information, an idea or an attitude from the nervous system of one person to the nervous system of another. To do this requires specific efforts of self-transcendence. The teacher must be himself in his knowledge, understanding and insight, but he must put him-

self in the place of the pupil in his imagination in order to effect the transfer of the information, idea or attitude.

In terms of the teaching process this means the selection of "things," symbols and processes of demonstration which are within the experience and understand (frame of reference) of the pupil in order to create additional understanding and insight. When this has been achieved communication has been accomplished; and the teaching and learning processes have been accomplished.

The use of television to accomplish this process simply gives the teacher an enlarged opportunity to select "things," symbols and processes of demonstration, which will tend to establish a "commonness" of information, idea or attitude with the pupil; and the "pupil" may be multiplied many, many times without lessening the probability of establishing a "commonness."

It is at this point in the television teaching process that requisite disciplines and efforts differ greatly from those obtained in the class room. In the first place, the teacher in front of the television camera is only one of a team, the most important one perhaps, but subject to the needs, limitations, coordination, and understandings of the various other members of the team, which may vary in size from 10 to 20 individuals.

The Television Teacher is subject to strict limitations of time and of personal movement. The television lesson starts on an exact tick of the clock and ends the same way. The television director creates most of the movement by either physically or electronically moving the cameras, and the Teacher generally keeps personal movement to a minimum.

The television lesson must be highly organized in every detail. The lesson must start from a definite point and arrive at a definite objective; and between the beginning and end of the lesson the major ideas or key concepts should be established at least in three different ways and on three different levels of acceptance. That is to say, each group of pupils will contain a variety of mental abilities which can be divided roughly into three different levels. The Television Teacher, unlike the classroom teacher, does not have the potential of knowing each pupil and being able to physically divide the group or to cater to their understandings separately. The Television Teacher must imaginatively divide the group and develop the presentation in three different ways which are designed to be accepted and related on three different levels of understanding. This must be done in such a way that one presentation does not

abort nor dilute the other to any significant degree. In other words, the good Television Teacher will practice true democracy or teaching and significantly communicate with the entire group without losing interest or contact with any part of it.

The last major area of difference between standard classroom teaching experience and television teaching is in the recognized objectives and the potential of accomplishing those objectives. In all areas of study and experimentation no doubt has been left that factual information and many skills can be taught as well or better by television as by traditional methods. These are important, and naturally occupy in some measure, a portion of any lesson; but it is in the area of ideas, insights, understandings and attitudes that television teaching becomes significantly effective in the teaching process. In these areas lies the greatest responsibility of the Television Teacher.

The careful organization, intense-focus, and high aural and visual impact or good television teaching make it especially susceptible to the creation and development of ideas, insights, understandings and attitudes in large and heterogenous groups.

In formal school work the drill for the memorization of facts, the detailed relation of concepts to local or specific instances or interests, and various testing procedures can well be left to the local group supervisors or classroom teachers; but the stimulation of interest, the inspiration of motivation and initiative, and the development of concepts and ideas should be the prime efforts and objectives of the Television Teacher. In these areas television teaching offers the greatest resource and possibility.

In order to understand and master the requirements of good television teaching it is necessary to understand and master the techniques and disciplines of good television communication. To do this one must first recognize television as a basically new and different medium of communication, and be willing to revise and modify some established ideas and attitudes regarding educational communication; and then one must accept the idea of working cooperatively in an area that has heretofore been rather personal.

These first two steps are the most difficult in the training of a good Television Teacher, but once accomplished the road is open to the mastery of the techniques and methods of the medium. One thing is certain, anyone who masters the techniques of television teaching will be a better teacher in the classroom or the studio.

The College Aids the High School Through Television

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DURING the past few years the thousands of published articles relating to experiments, experiences and research in educational television have left little room for doubt that teaching through this medium can be as effective as, and sometimes more effective than, teaching in the classroom in terms of motivation, interest, and retention. Those who feared that television would become an insurmountable mechanical barrier between the teacher and student and a destroyer of the elements of effective education are generally changing their minds, much like those who had the same doubts about the potential destruction of education by that 15th century mechanical offspring, the printed book, changed theirs.

It cannot be overemphasized that the purpose of educational television is not to relieve the national teacher shortage, nor to save money. Only incidentally should television accomplish these things. Where television has increased the effectiveness of the classroom teacher, brought an outstanding teacher to more students than could otherwise be reached in a normal classroom situation, brought objects closer to the eyes of the students, brought experiences, materials and skills to the students which the regular teacher would not be able to present, or which would not be physically possible of presentation in the particular school, then this medium has lived up to its potential. It is not the purpose of this article to analyze the needs of education or the ways in which television can fulfill these needs. The purpose here is to examine an important source of education for the high school which has remained, thus far, largely untapped.

Most television programs to the high school have been produced by Boards of Education through municipal educational television stations. In many instances the high schools themselves developed and produced their own programs; in others, the programs were developed by external agencies, aimed not for individual schools or classes, but for a general grade level or subject. In some cases the programs originated in the colleges and universities, utilizing the college and university equipment and teaching specialists not

usually available in the high school. It is this latter source that contains an enormous potential for the enrichment of the high school program.

The college may aid the high school through television in a number of ways. There are four major physical approaches. First, programs may be put on for the public at large on a commercial or educational television station. These programs are usually general in type, and are used primarily as supplementary material by the high school teacher. Second, programs may be broadcast over a closed-circuit and may originate from a specially equipped classroom. In this manner the high school student is able to participate in a college level learning experience. Third, programs may be broadcast over a closed-circuit from a television studio at the college. Such programs may be specifically designed to serve a particular need or group in the high school. Fourth, kinescopes or motion pictures of lectures and demonstrations may be presented over a closed-circuit system. Theoretically, such programming can bring any teacher and any equipment from any place in the world into the high school classroom. In this article we are primarily concerned with programs originating from the college which are specifically designed to serve a special group or need in the high school.

Perhaps the most immediate need is that of bringing to high school students materials that would not otherwise be offered because the high school does not have the technical equipment, facilities, or personnel. Every high school administrator is aware of the difficulties during the past few years of providing sufficient and satisfactory science courses for the curriculum and during the past many years of establishing a satisfactory curriculum in the arts. What was recently done by the Oklahoma State Educational Television Authority can be done in any community. High school students within a ninety mile radius of Oklahoma City were offered courses in Mathematics, Physics and the other sciences. Although this series was not given by a college, it is the college that is the logical center of personnel and equipment, and in any geographical area where a college exists, no high school student should be deprived of instruction in any subject area. A number of colleges have designed general courses for in-class viewing. Iowa State University presented a very successful "TV Schooltime" series, which was broadcast daily to elementary and secondary schools and which covered a great many academic areas. The University of Georgia

offered a similar program designed for in-class viewing, "Our World Today." One of the most successful programs in recent years was a guidance series presented by Texas Technical College. The series, "A Look at College," consisted of interviews, skits, discussions and demonstrations which served as an orientation course for high school seniors, acquainting them with the services of a typical college and the problems of adjustment to college life for the freshman student.

In some instances colleges have joined together to present program series for the secondary school. In Providence, Rhode Island, this was successfully done by Providence College, Brown University, and the Rhode Island College of Education, and in Alabama the University of Alabama and Alabama Polytechnic Institute cooperated with the State Department of Education, the Alabama Educational Television Commission and the Birmingham Television Production Center in presenting programs to enrich the curricula of grades one through twelve and to provide television instruction in areas where there are serious teacher shortages.

Some colleges have presented courses designed to give suprior high school seniors the opportunity to earn college credit even before they graduate. San Francisco State College conducted a notable experiment in this area in the teaching of Psychology. Station KUON-TV in Lincoln, Nebraska, televised a first year Algebra course to five high schools. This was a combined television-correspondence course for qualified students and was taught by a high school teacher especially released for this project, with the entire program under the supervision of the University of Nebraska.

Teacher training is another area in which the college may contribute to the high school. In New York City, over a closed-circuit system, science teaching techniques have been presented to teachers formerly unqualified in this field. The previously mentioned cooperative program in Alabama stresses in-service training to aid in the improvement of teacher skills.

Only a very few of the many contributions that have been made to the high school by the college through television have been noted above. However, the orientation of the programming has remained rather generalized. The specific, individual contributions that may be made have not yet been fully exploited. It seems likely that the greatest aid the college can offer lies not in an entire course or a series of programs, but in specialized projects designed to

enrich a particular part of the high school program or of even one class session.

In addition to, or instead of, a full course in, let's say, Elementary Physics, the college might present at selected times during the high school term, special experiments or lectures that the high school is not equipped to perform or the teacher not expert enough to give. In this way the college will be increasing the effectiveness of the individual teacher and the individual high school classroom situation. There would be no question of replacing the teacher entirely for the semester, but of supplementing and heightening what the high school teacher provides. Of course, in instances where the high school, for personnel or economic reasons, is unable to provide its students with anything at all in a given field, then the college could offer the entire course. In other instances, where the teacher has a working knowledge of the field, but is not especially trained in the area, the college could provide the basic lectures and/or experiments, and the teacher could follow through with discussion and testing.

The college can also contribute to the high school through direct teacher training, again, not through generalized programs, but through offering selected course elements that fill a specific need of an individual high school or a special group of teachers. This in-service training may be combined with the actual teaching of the course work. The teachers may watch and react to the methods and resources of the college expert through a two-way closed-circuit television hookup.

The college can contribute substantially in still another way that is not being fully taken advantage of at the present time. With the present refusal by many city, state and federal agencies to recognize the real needs of education, essential special services to the students, beyond the standard curricula, are sparse if existent at all. General guidance programs have been presented by many colleges during the past years, from vocational guidance to psychological adjustment to the teaching of good manners. More can be done in this vital area, for the lack of psychologists is one of the critical problems in secondary schools today. There are other critical areas: creative dramatics, music, dance, and art; visual aids; speech therapy. The college can bring teachers and specialists directly to the high school classroom with material designed to fit the needs of the individual high school.

For example, at Adelphi College we are at present experimenting

with and seeking foundation support for such specialized television programming, both to the elementary and to the secondary school. We are not televising entire courses. We are, instead, providing material required by an individual teacher, course, or school specialist. We do not propose to replace the high school English teacher who is spending some time on Shakespeare with the Shakespeare expert from the college. We do propose to provide a special lecture on a certain phase of Shakespeare when requested, and to make available a lecture-demonstration with our English Department's scale model of the Globe Theatre.

Within this same experimental program we are attempting to coordinate teacher training with the classroom situation. We do not propose to limit teacher training to actual course work presented over a closed-circuit by a college professor. We prepare television demonstrations and lectures, using a group of students to create an atmosphere comparable to the class situation in the high school, in which we teach the special subject matter requested. The high school teachers watch the teaching of that particular material and through a two-way video and audio hookup can question the college professor. Thus they may learn the subject matter and techniques necessary to teach that material to the high school class the next time it appears in the syllabus.

We are also experimenting with special services, particularly in the field of speech correction. Through two-way closed-circuit connections we are not only diagnosing speech problems, and giving in-service training at the same time, but also providing the therapy.

The work we are doing is not, of course, detailed here. Suffice to say that we are attempting to make the college's contribution through television to the secondary school more specific and more meaningful in terms of the secondary school's special needs, and an enrichment of any given course, rather than a substitute for it. It is suggested that high schools seriously explore the possibilities of what the college can contribute. Even for the high school that may seem to be completely self-sufficient, it is short-sighted to believe that higher education, through television, cannot enhance the curriculum by helping the secondary school to combine greater effectiveness of teaching with a more thorough satisfaction of its desires, if not its needs.

Study Skills Via TV

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STUDY skills is a high school subject which lends itself to television production with great facility. Primarily a series of explanations, demonstrations and practice, it can be broken down into 13 one-half hour programs and still cover the field adequately.

A proposed breakdown is presented by this author in the hope that it may be used by some ETV station for a high school audience. First will be presented the thirteen topics with an annotated list of six important points for each. In this author's TV experience six to eight points can be presented successfully each half hour. For maximum use, such a series ought to be kinescoped upon the initial presentation and then circulated for local broadcasts, closed TV circuits in high schools, or even for use by 16mm projectors, where closed circuits are not available. When TV tape-recording becomes practical, such a procedure will become automatically less expensive and more practical.

Certainly the quality of any group of high school student's study output can be heightened by such a course. With the high intrinsic interest value of television itself, the course gains additional stature in the eyes of the students.

Program 1. Habits and study
- A. The need for budgeting time for study
- B. Making a time budget
- C. The physical set-up for effective study
- D. Distractions eliminated
- E. Mechanics of concentration
- F. Mechanics of remembering

Program 2. Developing a good vocabulary
- A. The value of wide reading
- B. Concentrating on the worst subject
- C. Using a dictionary
- D. Useful prefixes and suffixes
- E. Common root words
- F. A thesaurus and synonyms

Program 3. Using the library
- A. Reference books
- B. Card indices
- C. The Dewey decimal system
- D. Reader's Guide
- E. Encyclopedias, yearbooks, atlases
- F. Common rules of libraries

Program 4. Reading a textbook assignment
- A. Surveying the assignment
- B. Questioning the topics
- C. Reading to find answers
- D. Reciting the material
- E. Reviewing the material
- F. How to keep notes

Program 5. Reading for information
- A. Skimming to find information
- B. Reading the newspaper

C. Reading graphs
D. Reading tables
E. Reading maps
F. Reading for ideas

Program 6. Reading for fun
A. Fiction reading
B. Understanding plays
C. Having fun with plays
D. Poetry reading
E. Reading aloud
F. Reading what you want

Program 7. Observing and listening
A. Know what to look for
B. Look systematically
C. Use instruments
D. The mind a notebook
E. TV and radio listening
F. Who to listen to

Program 8. Taking notes
A. Systematic organization
B. Common abbreviations
C. Advantages of note taking
D. Making notes on lectures
E. Making notes on assignment readings
F. Marking books

Program 9. Writing themes
A. Write what you know about
B. The theme structure
C. Sounds and words
D. Clichés
E. Finding the exact word
F. Painting a theme

Program 10. Writing research papers
A. Research sources
B. Methods of research
C. Thoroughness
D. The taboo of generalities
E. Facts and opinions
F. Polishing the paper

Program 11. Preparing and giving talks
A. Know the situation
B. Brevity
C. The use of stories
D. Preparation essential
E. Dramatize the talk
F. Use the audience

Program 12. Preparing for examinations
A. Review
B. Read widely
C. Organize discussion groups
D. Get exam materials together
E. Be on time
F. Ask yourself questions

Program 13. Taking examinations
A. Read whole test and budget time
B. Begin with easy questions in essay type
C. Think, then write
D. Read questions carefully
E. Watch absolute terms in true-false questions
F. Don't expect to be perfect

Sample TV Script for Program 10

Visual	*Time*	*Audio*
Standard opening shots	10"	Theme *Announcer:* And now, ABCD-TV is pleased to present *Study Skills Via TV,* a public service feature of this television station. Your host —Dan Smith!
Cut to Smith, seated behind school desk, globe and books on desk.	20"	*Smith:* Hello, there. Again it is my pleasure to bring to you some of the hints that superior students have revealed which

Visual	*Time*	*Audio*
		have helped them become better students. Our topic today is "How to write research papers." Does this scene remind you of an assignment you might have had?
Cut Camera II to schoolteacher making assignment	40"	*Teacher:* For Friday, I want you to prepare a paper on some aspect of life in America just prior to the Revolutionary War. I suggest you take some element of life in that era, such as transportation, housing or finances and cover it rather thoroughly rather than spread yourself too thin. I would hope that some of you will not write about George Washington, but will select an imaginary unknown man, woman or family to portray. Use research procedures in preparing this paper and make it as accurate as possible in all details.
Cut Camera I to student's hand writing the assignment down.		
Pan Camera I to instructor and fade.		
Cut to Smith, at desk.	1'15"	*Smith:* Ah, yes—so it goes in our schools. Now what will happen? I have succeeded in having as guests three of the students in that class. Let's see what they have planned to do.
Pan to Jones at table.		Mr. Ted Jones, what are you planning to do before Friday?
		Jones: (Gives the impression of being completely at a loss. Does not recall assignment, would not know what to do about it if he did recall it.)
Cut to Smith	2'30"	*Smith:* Yes—ah, yes—thank you very much. Let's see if our second guest has an idea.
Pan to Brown		*Brown:* (Has a vague, but incorrect idea of what the assignment was. But states he can find out from White.)
Cut to Smith	3'45"	*Smith:* I see. Well, how about it, Mr. White—could he find out from you?
Pan to White		*White:* Oh, yes, I have it all written down here. I also have a good idea of what I will do before Friday. Would you like me to outline that procedure?
		Smith: (off camera) If you please.

Visual	*Time*	*Audio*
		White: Very well, first I must locate some good sources of information. I think I would first of all consult the encyclopedia.
Camera cuts to closeups of White's hand pointing to location of various items in various references Encyclopedias History texts Historical novels	8′	(Smith and White now discuss the various sources of information for the research topic at hand.)

It will not be necessary to complete the entire script in this article. The segment given is sufficient to point out that such scripts should contain what are known as effective TV techniques: uniqueness of camera usage, dramatic illustrations and humor as well as the meat of the program, the six points in the outline.

The production of such a series of programs would indeed be a challenge and a pleasure, and one would hope, an effective instructional device for improving the study skills of high school students.

SOURCES OF INFORMATION AND SERVICE IN EDUCATIONAL TELEVISION

American Council on Education, Committee on Television
1785 Massachusetts Ave., N.W., Washington 6, D. C.

Educational Television and Radio Center (ETRC)
1610 Washtenaw Avenue, Ann Arbor, Michigan, Normandy 3-2476
National educational television program service for educational and commercial stations. Research data and general information on all phases of ETV movement. Publishes newsletter.

Joint Council on Educational Television (JCET)
1785 Massachusetts Ave., N.W., Washington 6, D. C., HUdson 3-6628
Publishes "Factsheet," a running inventory of ETV stations on the air and pending.

National Association of Educational Broadcasters (NAEB)
14 Gregory Hall, University of Illinois, Urbana, Illinois
Publishes newsletter, journal, conducts research in costs, school and university ETV policy, maintains engineering management, program, and production consulting services. Holds periodic training workshops in these areas.

Radio-Television Office, U. S. Office of Education
Federal Security Agency, Washington, D. C.
General source of ETV information. Conducts and publishes studies. Prepares directories of telecourses, closed circuits, ETV stations, college and university TV curricula, etc.

Institute for Education by Radio-Television
Derby Hall, Ohio State University, Columbus 10, Ohio

Plane Geometry from a Teacher in Seattle

JOHN K. WEISS
The Fund for the Advancement of Education

TWO years ago there were not as many people as we have in this room who could have been brought together to exchange experiences about television teaching. Today those of us here represent only a fraction of the people and the school systems involved with the daily use of classroom television. Barring some unpredictable reversal of this trend, I suppose we might all agree that the progress in the next two years will be far faster than it has been in the last two.

Let me suggest along these lines that if those of us who are today concerned with exploring new ways of improving American education can be as imaginative and as daring in the next few years as you people in this room have been in the past two, the chances for finding effective solutions to some of the most vexing problems in American education may be closer than we thought possible at that time.

We have all heard the sentiment expressed by Thomas Jefferson that "if a nation expects to be ignorant and free, in a state of civilization, it expects what never was and never will be." Now let me suggest in all seriousness that if we as a nation are prepared to apply the same energy, the same igenuity, and the same dedication to the problems of preserving and improving our freedom and our culture through education as we do to defending them through weaponry, then we shall all have done the greatest possible service to the nation.

Before we consider a few of the urgent problems confronting American education and the possibilities of dealing with them, we might profitably mention some of the tools which we could have and in some cases will have available. Let me name just four examples, every one of which is, I am told, scientifically practical and could be brought into every-day use just as soon as the educators indicate a need.

First, the matter of television channels. Most of us are accustomed to thinking in terms of a single television channel for a school system or a community. In a few instances where closed-

* From a speech at the Conference of the National Program in the Use of Television in the Public Schools, Sheraton Hotel, Philadelphia, Pennsylvania, February 6, 1958.

circuit facilities are being utilized we are experimenting with multi-channel programs, going as high as six simultaneous programs in at least one instance. But let us consider how many different classes are being taught here in Philadelphia, for example, at 9:00 every Monday morning in the elementary schools, the high schools, the independent and parochial schools, the colleges and professional schools, and all the other educational ventures within this metropolitan area. We are clearly talking about hundreds and perhaps thousands of separate instructional programs all taking place simultaneously throughout this area.

If there is some demonstrated need to take advantage of television for every single one of the different instructional programs, either for qualitative or quantitaive considerations or both, it is possible—with the knowledge we have today—to provide a separate television channel or a separate signal for each of these programs. We could, given our present knowledge, equip each student with a machine which would permit him to receive any one of these thousand different instructional experiences.

Second, the problem of "talk back." All of us have heard many many times that a grave, and possibly fatal, shortcoming of television instruction is that students do not have an opportunity to ask questions. Each of you involved with a television teaching experiment has had to consider this problem to some degree. But would it, for example, be more efficient if we were to equip every student with an individual transistor microphone which would enable him to communicate immediately with the television instructor? The questions could, if desired, be filtered through an electronic computer whose memory drum would sort out and list them in order of frequency, automatically rejecting those which were being answered later in the television presentation or which were clearly extraneous. Again, this is a possibility, to the point where a student anywhere in the United States might ask a question of a television teacher anywhere else in the United States and, if the teacher deems it worthwhile, get an answer within minutes. And not another student in our television class has to be distracted by the question. I doubt that we are ready today to use such equipment, but we can have it when we are ready.

Third, we have the technical knowledge today to establish regional film and kinescope libraries across the country, each operated wholly by automatic devices connected to the ordinary telephone system. Thus, given a supplementary film phone book, we could

dial the proper code number, turn on our television set, and see any lesson of any course which has previously been recorded and filed in this library. The charge might even appear on our telephone bill at the end of the month. Fantastic, perhaps, but is it really any more fantastic than the notion that we can carry on an immediate conversation with almost anyone in a civilized part of the world in the year 1958?

Fourth and last, let me mention a possibility which goes well beyond television. We have for years assumed that the evaluation of teaching was such a complex and subjective problem that it defied systematic and exact measurement. Each of us has to make judgments daily that Miss Jones is a better or worse third grade teacher than Miss Smith, but we go to incredible lengths to insist that we cannot and should not document this judgment.

Within the past few weeks I have had an opportunity to talk with three highly intelligent persons, each of whom is working independently on a different college campus, and all of whom have concluded that the quality of teaching is in fact a measurable concept which can be expressed by a mathematical formula, however, complex. I am neither courageous enough nor foolish enough to try to explain how these men propose to go about this problem other than to say that each of them has concluded that the only satisfactory measure of teaching is in terms of resultant effect upon one or more students. Thus each of them starts essentially with the notion that we are here now; we want to get to some designated point; and the relationship of the teacher to this process is a measure of the efficiency of teaching. They believe that they can express both the elements and the processes inherent in teaching in mathematical terms, by which they can be measured.

Disturbing as may be the concept that we can measure the educative process by a mathematical formula, these people, all educators themselves, are convinced that sooner or later the public will demand and receive a more complete balance sheet or financial statement for the increasing education bill which it is asked to pay. They are all certain that those individuals and institutions which can demonstrate conclusively the value of their product will be the ones to survive as the competition quickens for the available resources.

So much for these tools which we may put into use or have available within the next few years. Now let us take some of the ordinary garden variety of problems confronting our schools and

colleges and see whether we have in fact a real opportunity to deal with them effectively. Again let me choose four problems which can serve as convenient examples.

First, let us take up the matter of quality. I assume that we would all have no trouble agreeing that raising the quality of our educational programs is a major concern of all of us. Let us assume, for example, that we are concerned about equipping our young people to think originally about the conflict between capitalism and communism and to contribute, as they mature, to the peaceful solution of this critical problem.

Given our newly developing tools of education, we might, for example, call on our electronic computer to sort out for us what the most thoughtful people of history have had to say about this problem; we might bring to all our high school youngsters the day-to-day views of a whole group of persons ranging from President Eisenhower, Secretary Dulles, former President Truman, to Acheson, Kennan, Toynbee, Lippmann, Khruschev, Churchill, Gandhi, and clearly the list could go on and on.

As problems such as mental health, the conquest of space, the evolution of man came up in the curriculum, we would no longer be limited to a few authorities who have taken time to set their thoughts down on paper in that antiquated teaching aid we call a book. We could offer to every child the whole range of imaginative and original people available, communicating in person to generation after generation. Consider, for example, the potential impact of a Plato or an Aristotle over the centuries if we had all been privileged to see and hear them discuss the fundamental problems of mankind rather than having had to reconstruct their ideas from silly little black marks on white pieces of paper.

Or take a second problem, teachers' salaries. It seems clear that if we can truly measure the productivity of a teacher, and if we can increase his productivity almost infinitely through technological developments, we have an opportunity to demolish the teacher salary problem once and for all. In fact, it is not impossible that our school teachers, who may be teaching groups comparable in size, for example, to those which Lucile Ball and Elvis Pressley are entertaining, will receive comparable compensation. It is clearly possible for our outstanding teachers to take their place alongside of our outstanding physicians, lawyers, bankers, and industrialists.

To be specific for a moment, let us assume that a high school plane geometry teacher under a conventional teaching situation

today, has a student load of 125 and receives compensation of $6,000 a year. We assume further that he carries the full responsibility for instructing these students in plane geometry and that, on a per student basis, society provides $40 per student for this service.

Now given our new technology, this same teacher, because he is a superlative teacher, has a class not of 125, but of 10,000. But, because he is not able to do over television everything he could do in a classroom with 25 students, he no longer has full responsibility for the instruction program in this subject. Let us say he has only half the responsibility. Assuming no inflation and a constant evaluation by society for this assignment, our teacher is now entitled to $20 a student times 10,000 students, which, if my arithmetic is correct, comes out to $200,000 a year. Impossible? I don't think so. Certainly we have others in this country whose income is in that range, and in the Soviet Union whose educational advances are being widely extolled even in our country today, a top university professor may receive the equivalent of $384,000 a year, even without television.

Or again, let us take the matter of school buildings. There probably is not a school system in the country which is not concerned today with expanding its physical facilities to take care of an exploding school population. But if we alter our education process radically in the near future, do we need to use the same kind of packaging as we have in the past. If, for example, we offer merely one-half of our instruction over television, could we permit all the children to stay home for half the day where they would not have to suffer the distractions of others as they attempt to learn from this type of instruction. We are not shocked by the notion that a student should read a book by himself; might he not take his television lesson by himself? Such a simple shift as this would immediately double our existing facilities and unleash tremendous sums of money for other education purposes. We might be able to give consideration in our new buildings to more small spaces where we can provide individual or small group instruction by those teachers who have been freed from conventional teaching responsibilities by the intelligent use of television teaching.

Last but by no means least, what about the shortage of talented teachers? If our plane geometry teacher with his class of 10,000 only takes half the responsibility, do we need to have just as many teachers as before to handle the other half. If not, what number

do we really need and what will their functions and responsibilities be? I would guess that almost any one of you in this room is better able to answer these questions than I. It seems reasonable, however, to assume that the classroom teacher coordinated with the TV teacher will have very different responsibilities than in the conventional methods of the past. It seems clearly demonstrable even now that he can exercise those responsibilities with a much larger group than his 125 students. The answer may even be that he will be responsible for 500 to 1000 or 2500 students, although he does not work an equivalent amount with each one. For some students the television instructor may in fact carry almost the entire load; for others individual teaching may be necessary. Our local classroom teacher will have automatic marking machines, he will have able students, he will have parents and clerks and others who will help him in his job. It is he, in the long run, who will still have the final responsibility for helping each of these students learn the Pythagorean theorem.

Some of you, I expect, may wonder whether I am seriously suggesting these steps as means to deal with many of the more critical educational problems we face in this country today. I believe the answer to this question is, quite frankly, that it makes no difference whether I or anyone else recommends or opposes them. We are going to see radical changes in our lifetimes in the public schools. All of you here today have perhaps brought us as far along as the recent launching of the first three satellites. But the future suggests that we shall shortly have space platforms, manned explorations of the moon, and infinite use of solar energy.

The children who are starting school this year in Miami or Norfolk or Philadelphia or Hagerstown will find the idea of learning plane geometry from a teacher in Seattle less shocking than you and I find the notion of a dead dog orbiting around the earth in a half-ton metal container.

We have come a long way in recent years. But it would be a rash person who would assume that we have taken more than a few halting steps along the exciting road to tomorrow's education.